TOWARD A PRACTICE OF IMPACTS MANAGEMENT: INSIGHTS FROM AN EXPLORATORY CASE STUDY

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TOWARD A PRACTICE OF IMPACTS MANAGEMENT: INSIGHTS AND IMPLICATIONS FROM AN EXPLORATORY CASE STUDY

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Adaptive Impact Management (AIM) was proposed to help wildlife managers integrate diverse knowledge bases, involve stakeholders in decisions, and design decision processes that differentiate management ends and means. In concept, AIM: (1) makes stakeholder-defined impacts the focus of management objectives; (2) uses a transactional approach to stakeholder engagement ; and (3) conducts situation analyses to clarify management context and the dynamic complexity of systems that generate impacts. Applied research is needed to understand potential adoption and evaluate the utility of AIM as an innovation to the cyclical decision-making process of wildlife management.

From 2001 to 2008, I conducted action research with a team of practitioners who adopted an AIM approach for black bear (*Ursus americanus*) management in New York State. This in-depth study uses case research to evaluate that first full implementation of AIM. Taking a single-case research design with three embedded units of analysis (i.e., management stakeholders, mass media, wildlife managers), I used a mixed-methods approach combining quantitative (e.g., survey research, media content analysis) and qualitative (i.e., participant observations, analysis of interview transcripts) data collection techniques to challenge key assumptions of AIM in practice. I examined theoretical assumptions of AIM as an explanation for findings, in comparison to a rival explanation that implementation failings alone explain the data. Case description was used to develop tentative hypotheses about how and why particular AIM components were adopted. Multiple sources of information established chains of evidence to improve construct validity. Pattern matching,

explanation building, construction of rival explanations, and process logic models were employed to improve internal validity.

Findings indicated that implementation of transactional stakeholder engagement, impacts-focused analysis, and systems thinking exercises produced learning, knowledge integration, administrative support for regulatory proposals, and other positive outcomes. I found support for several key assumptions underlying AIM. Benefits not withstanding, findings imply that diffusion of AIM in New York will depend on continued intervention by scholars of the AIM approach, at least until agency staff experience and capacity have developed further. Sustainability and utility of AIM will also depend on structural changes within the sponsor agency that increase capacity for transactional communication with stakeholders.

BIOGRAPHICAL SKETCH

William F. Siemer was born July 24, 1961 in St. Louis, Missouri. He earned a BS degree (1983) in wildlife management from the University of Missouri, Columbia, and an MS degree (1986) in the human dimensions of wildlife management from Michigan State University. He began working with the Human Dimensions Research Unit (HDRU) at Cornell University in 1987 and entered the Cornell University Employee Degree program in 2000. He is married to Deborah Short Siemer and they have 2 children, Ben and Emma.

In dedication to my father,

William F. Siemer

(1927 – 2008)

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I am indebted to my graduate committee members for the time and expertise they contributed to this body of work. I'm grateful to Dan Decker for providing guidance throughout this project and for serving as a constant source of professional inspiration. Special thanks to Jim Shanahan and Dietram Scheufele (Cornell Communication Department) for their contributions to design and interpretation of study elements that examine exposure to mass media and how such exposure may influence attitudes. Scott Peters was an invaluable resource on aspects of this work that deal public issues education.

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Many members of Cornell University's Human Dimensions Research Unit in the Department of Natural Resources contributed to this study. Former HDRU staff member Shawn Riley, now Associate Professor at Michigan State University, played a lead role in developing the adaptive impact management approach that serves as a foundation for this research, and he led modeling efforts that laid the foundations for

model work reported here. Shawn Riley, Jody Enck, and Tommy Brown made valuable contributions to questionnaire development. Nancy Connelly assisted with supervision of survey implementation and data analysis. Karlene Smith, Meg Faville and Krista Guerrero assisted with survey implementation and data entry. Meredith Gore and Karlene Smith assisted with media content analysis.

The bear sensitivity index (BSI) included in my mail survey of black bear management stakeholders was developed by Peter Bull and R. Ben Peyton (both from Michigan State University). I'm grateful to Peter and Ben for working with me to adapt the BSI for purposes of my research.

I am grateful to the residents of New York State who provided feedback for this study by participating in small group meetings or by completing a self-administered mail-back questionnaire.

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AIM	Adaptive impact management
BMPT	Bear Management Plan Team
BOW	Bureau of Wildlife, NYSDEC
CLD	Causal loop diagram
CCE	Cornell Cooperative Extension
DEC	New York State Department of Environmental Conservation
GDSS	Group decision support system
GMB	Group model building
HD	Human dimensions
HDRU	Human Dimensions Research Unit
IM	Impact management
NYSDEC	New York State Department of Environmental Conservation
SARF	Social amplification of risk framework
SEM	Structural equation modeling
SD	System dynamics
SIG	Stakeholder input group
SOPM	Standard operating procedure manual
WMU	Wildlife management unit

CHAPTER ONE

DISSERTATION OVERVIEW

Introduction

For nearly a decade, I have been involved with a group of colleagues striving to bring fundamental change to wildlife management as a process. My dissertation focuses on one aspect of that larger professional project, a process innovation called "Adaptive Impact Management" (Riley et al. 2003); hereafter referred to as AIM or IM.

The origins of the AIM concept trace back to an article by Riley et al. (2002) titled, "The Essence of Wildlife Management." Riley et al. (2002) invite wildlife professionals to reflect on wildlife management as a decision-making process. The article asserts that wildlife management in most of the 20th century "was grounded in two precepts: sufficiency of biology and expert authority" (Riley et al. 2002:585). Early wildlife professionals were taught that insights from biological sciences were sufficient to make wildlife management decisions, and thus, wildlife biologists, "by virtue of their training and expertise," should be trusted to make wildlife management decisions with relatively little public participation in decision-making. That traditional philosophy framed wildlife challenges as technical problems to be solved by technical experts (Riley et al 2002:585).

Riley et al. (2002:585) suggest that the principles of that traditional management approach "are being supplanted in practice by new foundational precepts that reflect a need for integration of multiple disciplines in management and the desire among diverse stakeholders to participate in decision-making (Mangel et al. 1996)." Integration of more varied information sources and greater stakeholder engagement has occurred in the wildlife management profession over time, due both to external pressures that "push" agencies to change, and internal forces that "pull" agencies

toward new approaches that will help them succeed in a changing management environment.

Wildlife management agencies are facing a growing list of challenges that involve uncertainty, complexity, and conflicting value orientations or worldviews. Riley et al. (2002:589) assert that "Crucial management cases warrant a structured, adaptive process that can bring biological and social science to bear directly on the issue, yet encourage learning through active management (Holling 1978)." They also argue that the most difficult wildlife management issues require an approach that recognizes change as inevitable, and uncertainty and unpredictability as inherent, in resource management. AIM was offered as an approach that meets those criteria.

AIM is an innovation in wildlife management as a comprehensive decision-making process as outlined by Krueger et al. (1986) and Decker et al. (1992, 2001). There are three key components in AIM as an innovation in the typical cycle of decision making. First, AIM builds on the traditional management cycle by adding a focus on stakeholder-defined impacts. Second, AIM places an explicit emphasis on systems thinking or systems modeling to inform decision making. Extensive stakeholder engagement is a third distinguishing element of AIM. Because AIM makes stakeholder-defined impacts the central element of management programs, it requires an informed transactional approach to stakeholder engagement.

Dissertation Purpose

To date, AIM remains primarily a set of published concepts rather than a practice adopted and implemented by wildlife agencies. It is not yet in widespread use and a full cycle of impact management has never been described or critically evaluated in the wildlife management literature. Implementation challenges must be better understood to assess or influence adoption of this innovation by wildlife management professionals. The underlying premises of AIM also must be challenged

under conditions of actual practice to evaluate the degree to which proposed benefits of an AIM approach can be achieved under the conditions in which state wildlife agencies operate. My dissertation addresses those information needs.

Between 2001 and 2008, I worked with a team of wildlife managers to develop, implement, and critically evaluate an impact management approach to black bear management in New York State. This dissertation presents my case research reflections on what is to date the most complete implementation of impacts management by a state wildlife management agency.

The purpose of my case study was (1) to evaluate critically the process and outcomes of a multi-year pilot use of adaptive impact management and (2) based on case research insights, offer conclusions and recommendations for wildlife professionals interested in the practice of impact management by state wildlife management agencies.

Case research questions

Process innovations, like AIM, promise a set of benefits for adopters (theoretical premises and expected benefits of AIM are described in detail in chapter two), which are ostensibly benefits that will contribute to improved agency performance. Failure to achieve the expected benefits of an innovation can occur because the process innovation does not work as promised (i.e., the assumptions or conceptual foundation for the process are flawed or do not apply to the user's context) or because of shortcomings in innovation implementation. Thus, I conducted case research to address questions about the promises of AIM and the practical constraints facing agencies that may implement AIM as an innovation in the process of wildlife management. My five case-research questions were:

1. How were the principles of AIM implemented in this case?

2. Why were some portions implemented and others not?

3. Does this pilot project provide evidence that AIM holds the potential to deliver outcomes that would improve wildlife agency performance?

4. What do the insights from this case imply for continued implementation of impact management by this agency, and wider adoption of impact management by other wildlife agencies?

5. What do the insights from this case imply for the practice of impact management as a vehicle for public issues education about wildlife management issues?

The Research Context

I completed my dissertation as part of an employee degree program at Cornell University. In my professional life, I work closely with teams of natural resource managers to help them understand the human dimensions of wildlife management issues and to incorporate that understanding into decision making processes. In 2001, I became involved in development of a framework for making black bear management decisions in New York State. That work afforded me a unique opportunity and a specific context within which to explore research questions about the challenges of implementing AIM and the conceptual underpinnings of an AIM approach.

My dissertation work was embedded within a stream of applied research and outreach projects I conducted as a university-based specialist in the human dimensions of wildlife management, in New York State between 2001 and 2008 (described in chapter three). The projects were funded by the New York State Department of Environmental Conservation (NYSDEC), and their purpose was to support the information and training needs of a management team charged with developing a comprehensive plan for black bear management.

I took on multiple roles during the project, including: researcher, advisor, adult educator, group process facilitator, and change agent. Throughout, my efforts pivoted

around the assumption that wildlife managers can create better decision frames by viewing their work as public issues management. Insights accrued both from the individual activities I completed with managers and from the cumulative experience of interacting with the same group of managers as they worked through their issue over an extended period of time.

Readers should know that my own education and background are in wildlife management and I've spent two decades conducting research and outreach to support decisions and programs within state wildlife agencies. My personal biases include a belief that wildlife agencies can play a constructive role as trustees of the public wildlife resource. I want them to succeed in that mission. As a researcher and advisor, I have the potential to be a change agent working from within the established wildlife management system to stimulate planned change that allows agencies to adapt to a changing management environment. My work has focused and will continue to focus on finding ways to promote development of the wildlife management profession from within, although I acknowledge that external forces can be a potent force for large-scale change, and I regard externally forced, discontinuous change as a positive (if painful) part of the wildlife management profession.

My work includes a normative element. My professional biases include the belief that citizens' values should be considered and included in wildlife management decisions. I believe that wildlife professionals should continue improving processes for stakeholder engagement in wildlife management because doing so will improve public discourse about societal values in management decisions.

Some of my dissertation work contains elements of action research (McTaggart 1991, Reason and Bradbury 2001) and the overall project might best be described as public scholarship (Peters et al. 2005, 2007). Peters (2007:21) speaks about public scholars as "scholars who are more than responsive experts and detached

social critics, but also proactive educators, citizens, and cultural workers who participate in and sometimes even organize public work." My work was embedded in and reflective of a body of public scholarship conducted by the Human Dimensions Research Unit (HDRU) (for a detailed account of that work, see Peters et al. 2003). For more than two decades, HDRU staff like myself have worked with Unit Leaders to engage with wildlife managers on collaborative research where wildlife professionals are viewed as partners in the research projects. We have often engaged as adult educators who work with wildlife professionals to organize public work (e.g., deer management task forces, deer management citizens' groups) and we endeavor to promote learning from scholarship about that public work.

Perceived risk associated with human-bear interactions in residential areas

A recurrent theme in my dissertation chapters is perception about the threats black bears pose to human health, safety, and economic well-being. For some stakeholders, perceived risk leads to elevated concern about the presence of black bears. Elevated concern about bears is an impact for some people (i.e., elevated concerns are an effect of human-bear interactions important enough to serve as a focus for management attention). Among the possible impacts associated with human-bear interactions, the managers I worked with became most interested in understanding and managing the concern level associated with elevated risk perception about bears in residential areas (in part, because they believed that focusing on concern levels in residential areas is important to maintain human tolerance for a viable black bear population in New York). I utilized managers' applied interests in understanding risk perception as a vantage point from which to explore several theoretical questions, such as the role of mass media and personal frame of reference on stakeholder perceptions of risk. Risk perception also became a focal point from which I could crystallize ideas

about improving decision frames through public-issues education with and for wildlife managers.

Theoretical Framework

I drew on several bodies of literature and theory (described in detail in chapter two) as the basis for my research and outreach activities. I drew on case research literature for guidance on overall design and design of specific research techniques. In particular, I relied on methods publications by Leonard-Barton (1990), McCutcheon and Meredith (1993), Darke et al. (1998), Yin (2003), and Hancock and Algozzine (2006).

My work as an interventionist and my analysis of the pilot project as a process innovation were informed by literature on innovation adoption (e.g., Dewer and Dutton 1986; Frambach and Schillewaert 2002; Gopalakrishnan and Damanpour 1997; Rogers 1995) and innovation implementation (e.g., Klein and Speer Soora 1996).

My work was informed by impacts management literature (Riley et al. 2002, 2003, Organ et al. 2006). The research questions I addressed represent a few of the many information gaps that must be addressed through research and pilot projects in order to advance the practice of impacts management.

Public involvement literature (especially Daniels and Walker 2001, Fischer 2000, and Forester 1999) and learning theory (especially Merriam and Caffarella 1999 and Mezirow 1991) informed my assumptions about means to integrate HD considerations into wildlife management decisions. My assumptions about decision framing processes were influenced by literature on decision making by researchers such as Gregory (2000), Hammond et al. (1999), Kahneman and Tversky (2000), and Keeney (1992).

My research on mass media reporting of black bear management issues was informed by literature on media framing effects, especially the work of Entman

(1993). My approach to research on mass media was informed by the mentoring of my graduate committee members, Dietram Scheufele (especially Scheufele 1999) and James Shanahan (especially Shanahan and McComas 1999).

My group model-building work was informed by system dynamics and systems thinking literature. I was particularly influenced by the literature on group modeling processes (e.g., Andersen et al. 1997, Hines 2001, Rouwette 2003, Stave 2002, Vennix 1996, Otto and Struben 2004) and systems thinking (e.g., Hammond et al. 1999, Richmond 2001, Senge and Sterman 1994, Sterman 2000).

Finally, interactions with a graduate committee member (Scott Peters) and literature on public issues education concepts and practice informed my work. Public issues education is a theme that occurs in a number of research and outreach publications I have coauthored (Decker et al. 2002, 2004; Curtis et al. 2003; Siemer et al. 2000). Publications by Hahn (1988, 1990), Dale and Hahn 1994, the Extension Committee on Organization and Policy (ECOP 1992), and Patton and Blaine (2001) are referenced extensively in those writings and also influenced my thoughts on issue education during this case study.

Methods Synopsis

Exploring different aspects of the case required use of multiple methods and embedded units of analysis, as well as data collection over a period of several years. At various points in my project I addressed some research questions using quantitative data collection techniques (i.e., mail survey techniques, document content analysis, and regression analysis). I also addressed some research questions using qualitative techniques (i.e., observation, participant observation, archival document analysis, personal interviews). I describe methods at length in chapter three. Additional detail about instrumentation and analysis also appears in chapters four-six.

Contributions and Limitations

Project contributions

This was an applied project, conducted in a real-world context where many factors are beyond the control of a researcher or advisor. Nevertheless, the project was designed to explore questions at a conceptual level and it makes several theoretical contributions. It contributes theoretical/conceptual insights about factors that may facilitate or impede transfer of a process innovation (impact management) from its developers to practicing wildlife professionals. The project advances understanding of how individual frame of reference and media messages may influence impact perceptions held by wildlife management stakeholders. The project also provides the first critical examination of the conceptual assumptions of adaptive impact management under conditions of actual practice, and as such, extends the articulation of, and provides insight about, the conceptual foundations of AIM. In particular, the work makes a conceptual contribution by articulating the informed transactional approach as part of the continuum of stakeholder engagement described by Decker and Chase (1987). Finally, this work makes a conceptual contribution through reflections on wildlife management challenges as public policy issues, and reflection on AIM as a vehicle for public issues education.

With respect to methods, the contributions of this work include development of a new process (the stakeholder input group [SIG] process) to support an informed transactional approach to stakeholder engagement.

The project makes its greatest contributions to practice. The real-world context for the work was well suited as an environment for learning, and the work provides information that will inform an improved practice of impacts management by state wildlife agencies. It provides a case study example that wildlife professionals can follow to identify and clarify impacts, gain a working knowledge of the frames

that mass media use and how those frames are picked up by stakeholders, or how their organization can use systems thinking techniques to learn about their management system and evaluate impact management actions.

The body of work presented here led to practical guidance that the wildlife professionals involved found useful and beneficial to their organization. The sponsor agency continues to use many of the concepts, tools, and processes developed during this dissertation project, providing evidence of its practical utility. Findings and insights from the project have been communicated to a broader audience through multiple presentations and a widely distributed practitioners' guide, so that other agencies or NGOs could apply the same lessons to their practice.

Limitations within a larger change project

Integration of biological and social science information into wildlife management decisions has been a persistent problem facing the institution of wildlife management in North America. Riley et al. (2003) proposed AIM as a mechanism to promote fuller integration. This dissertation attempts to address that problem through a critique of AIM with regard to its ability to bring about better integration, among other things.

Making significant strides forward on a continuum toward the ideal state of full integration will involve deep changes in the wildlife management institution. In chapter two, I identify and discuss potential impediments to integration (i.e., organizational structure and culture, professional identity, professional education and training). Some of those impediments are social rather than technical, so better integration in the wildlife profession will require changes that cannot be achieved solely by technical innovations like AIM. I recognize that AIM (and by extension this dissertation) was not designed to address all impediments to integration in wildlife management. I regard AIM as one piece of a larger puzzle, a potential mechanism

(and until my work, an untested mechanism) to facilitate and perhaps speed a continuum of professional change already underway in many wildlife agencies. I offer this dissertation as one contribution to a larger professional project of organizational change (one that I hope to contribute toward throughout my career).

Overview of Chapters

Chapter two reviews the foundational premises of AIM, the key assumptions underlying those premises, and the benefits promised to wildlife management agencies which put the premises of AIM into practice. Chapter two includes assertions about how and why wildlife agencies are expected to benefit by implementing AIM. Some assertions about how and why agencies should benefit are described in the foundational publications for AIM (Riley et al. 2002, 2003). Other assertions, like the thoughts I offer on transformational learning, the informed transactional approach to stakeholder engagement, and using AIM within a broader issue education mission, represent my own literature-based efforts to extend articulation of how and why AIM should benefit agencies in practice.

The assumptions discussed in chapter two are related to public involvement in wildlife management, adult learning, decision making, impacts management, media framing, group model building, systems thinking, and public issues education.

Chapter three provides a general overview of my case study research and the specific data collections and analysis techniques I used in each phase of my work.

Chapter four focuses on case study insights about identifying, clarifying, and linking impacts to fundamental objectives. In addition to describing how an impacts management approach was applied, chapter four summarizes related outcomes (changes in activities and practices, language and discourse, or social relationships) and uses multiple analysis approaches to draw conclusions about the assumptions and implementation of impact management.

Chapter five focuses on a specific aspect of situation analysis: understanding mass media coverage of wildlife-related issues and how such coverage may influence stakeholder-perceived impacts. This chapter reports findings from a study of media content to determine how media coverage available to New York State residents between 1999 and 2002 framed black bear management problems and solutions. Chapter five also uses findings from survey research to develop a conceptual model theorizing how mass media exposure and personal frame of reference contribute to mental models of bear-related risks.

Chapter six switches focus to the results of an 18-month group-model-building process with a team of wildlife managers. The chapter discusses simulation results produced by a quantitative model developed with a team of managers. The purpose of the model was to help the management team learn about three management actions they were considering as means to reduce negative human-bear interactions in residential areas of New York State. The chapter focuses on learning outcomes obtained by the group, conclusions about use of systems models as part of impact management, and implications for issue education with wildlife managers.

In chapter seven, I move to a second level analysis to discuss the broader questions that this case study research raises for continued improvement and diffusion of AIM. Based on insights gained from this multi-year case research project, I synthesize conclusions and implications across specific case research units of analysis, and I offer recommendations for wildlife professionals and change agents interested in the practice of impact management by state wildlife management agencies.

CHAPTER TWO

THE PREMISES AND PROMISES OF ADAPTIVE IMPACT MANAGEMENT

Introduction

Yin (2003) identifies articulation of study propositions as one of five key components of case research design. In this case study, the linked premises and assumptions embedded in adaptive impact management (AIM) served as case study propositions.

The purpose of this chapter is to review and evaluate the foundational premises of AIM and key underlying assumptions about how and why a practice of AIM will yield promised benefits to wildlife management agencies. I begin the chapter with a summary of components within AIM. I then use chapter Part II to present assertions about how and why wildlife agencies should benefit from using an AIM approach. Chapter two provides a conceptual foundation for later chapters, where I critique the linked premises and assumptions of AIM under conditions of actual practice.

Most of the assertions I describe here are not supported at length in foundational publications for AIM (Riley et al. 2002, 2003; Enck et al. 2006, Organ et al. 2006). I rely on a broad review of literature in multiple disciplines to more fully articulate AIM assumptions about deliberation, learning, stakeholder engagement, systems thinking, and issue education.

Part I: What is AIM?

In the postscript of *Thinking like a Manager: Reflections on Wildlife Management*, Organ et al. (2006) define what they believe to be the core work of a wildlife manager.

> "…in our view, the wildlife manager has three essential tasks to achieve management goals. The first, as noted and emphasized, is to integrate biological and social science knowledge. The second is to involve the public, as necessary and appropriate, in management decision making. The third is to design effective decision processes that identify and differentiate between

> fundamental objectives (ends based on impacts) and enabling objectives (means or strategies to achieve ends). ” (Organ et al. 2006:89)

AIM was proposed as a guiding framework wildlife managers can use to complete those three essential tasks for a given program or management issue. A practice of AIM is expected to help managers achieve their essential tasks by bringing innovation to wildlife management as a cyclical decision-making process.

The following subsections highlight the innovative aspects of AIM as outlined in Riley et al. (2002, 2003) and Organ et al. (2006). I begin by describing innovations to steps within the decision making cycle. I then discuss innovations related to stakeholder engagement supporting the decision-making cycle. I finish Part I by discussing how multiple aspects of AIM are expected to foster integration as teams of practicing managers complete the steps within the decision-making cycle.

AIM as a decision process innovation

Crowe (1983) described the basic elements of the wildlife management process as setting goals and objectives, selecting actions to achieve objectives, implementing actions, and evaluating actions. Kruger et al. (1986) and Decker et al. (1992, 2001) expanded that simplified model and encouraged wildlife professionals to conceptualize wildlife management decision-making as a comprehensive process founded on an integrated ecological and human dimensions database. Riley et al. (2003) went a step further, proposing AIM as an innovation in adaptive management or adaptive resource management as described by Holling (1978) and Lancia et al. (1996), respectively. The process elements of AIM (Figure 2.1) are described in Riley et al. (2002).

> “Components of an AIM process, taken stepwise from the point of initializing implementation, include situational analysis, objective setting, model development, identification and selection of alternatives, management interventions, monitoring, and adjustment to models and management (Figure 1)” (Riley et al. 2003:85).

Several interrelated components of AIM distinguish it as an innovation in the cyclical process of decision-making described by Decker et al. (1992, 2001). Most notably, AIM builds on the traditional management cycle by adding: (1) a focus on stakeholder-defined impacts as the basis for setting fundamental objectives; (2) use of systems thinking or systems models to inform decision making; and (3) reliance on an informed transactional approach to stakeholder engagement and decision framing (discussed later in this section). A brief overview of the elements in Figure 2.1 will help illustrate the distinctive features of AIM.

Situational analysis

A cyclical process of wildlife management decision making typically begins with situational analysis. The purposes of situational analysis distinguish AIM from previous approaches to decision making.

> "The principal objective of situational analysis is to frame the decision-making situation (Keeney, 1992, p. 30-33), by delineating the decision context, identifying potentially relevant impacts (i.e., the expression of values that should be addressed as fundamental objectives), and describing the management environment in which the pertinent impacts occur." (Riley et al. 2003:86)

One of the central activities within AIM is decision framing (Riley et al. 2003:86). A decision frame consists of the values and action alternatives that are considered in a decision (Keeney 1992). Decision frames establish direction for successive management efforts (Hammond et al. 1999). For practicing wildlife managers, the task required is constructing decision frames for the policy and agency action recommendations they make to senior leadership in their agency (e.g., agency directors, agency commissions or commissioners). An excerpt from Odell et al. (2005) succinctly captures the importance of decision framing for natural resource managers.

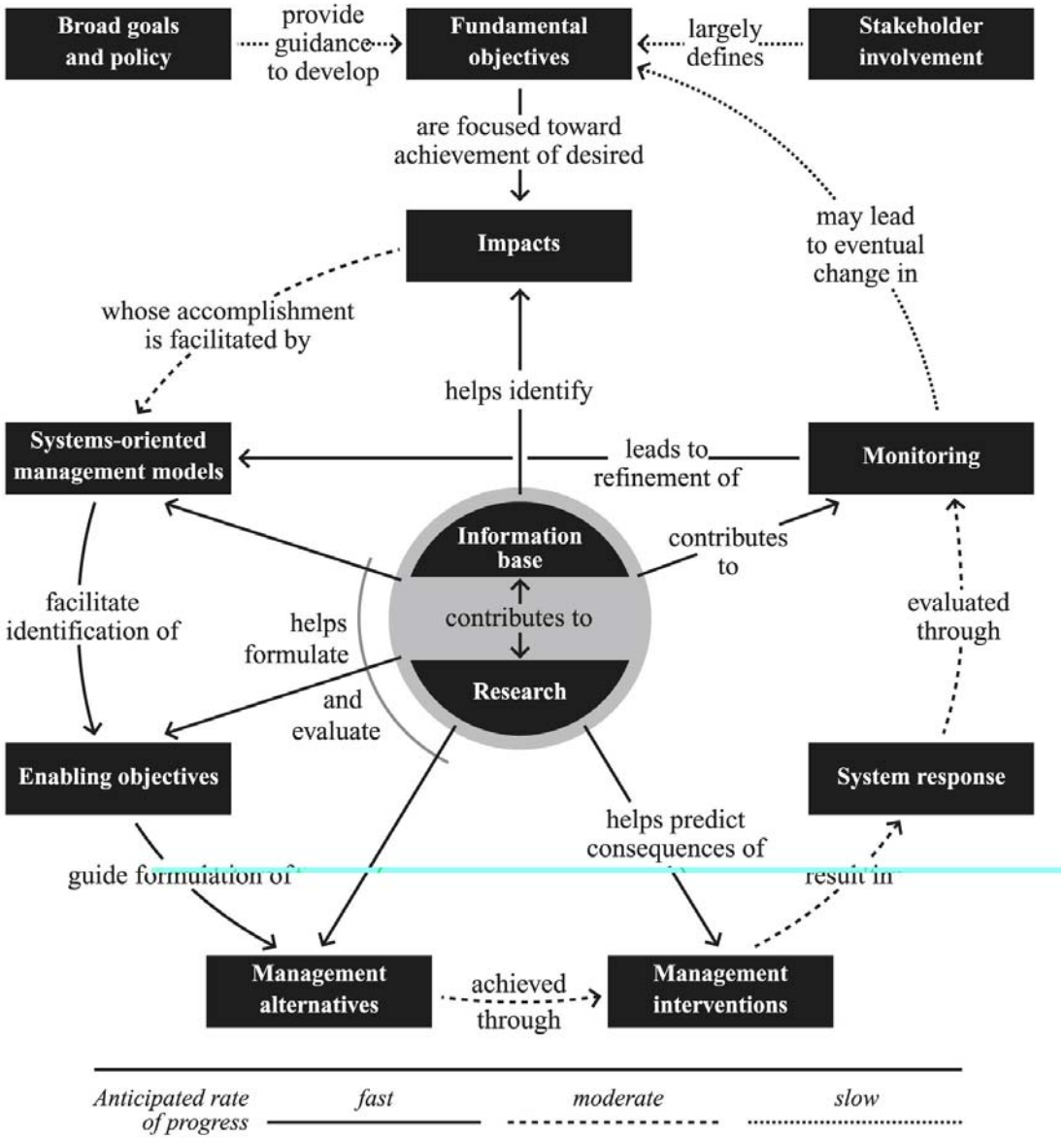

Figure 2.1. A schematic representation of the adaptive impact management process. (Source: Riley, S. J., W. F. Siemer, D. J. Decker, L. H. Carpenter, J. F. Organ, and L.T. Berchielli. 2003. Adaptive Impact Management: An Integrative Approach to Wildlife Management. Human Dimensions of Wildlife 8:81-95).

> "…If the sociological and biological features of a conflict are not concurrently addressed, the contested issues will be perpetually recast, often in the courts…To prevent contested issues from forever eluding resolution, integrated interdisciplinary teams need to work continually to understand and reframe both biological and sociological issues as new information becomes available." (Odell et al. 2005:745-746)

Situational analysis is conducted to inform decision frames. When faced with simple or routine decisions, managers can rely on situational analyses that are brief, experience-based, and individualistic. AIM is recommended for more complex decisions, and thus AIM situational analysis is more extended, research-based, and collective in nature. Organ et al. (2006) repeatedly emphasize that situational analysis, as well as other parts of the decision-making cycle, are best accomplished by an interdisciplinary team of wildlife professionals who can ensure that biological and social dimensions of a decision are brought to bare on construction and revision of a decision frame.

Impacts. Impacts are stakeholder-defined important effects resulting from interactions among people, wildlife, and wildlife habitat (Riley 2002). Identifying and clarifying stakeholder-defined impacts is a central activity in AIM and requires more in-depth situational analysis than was typical in the past. Understanding how impact perceptions are formed or influenced may also become part of a useful situational analysis. Research on stakeholders' media exposure, personal experience, and interpersonal communication may be a useful part of situational analysis because all three are thought to influence formation of impact perceptions by stakeholders.

System-oriented models

Systems thinking is suggested as a specific type of decision support activity within AIM. An explicit reference to systems thinking (i.e., the box labeled "systems-oriented management models") appears in Figure 2.1. Riley et al. (2003:91) contend that a systems approach to making wildlife management policy decisions is

advantageous because it offers: "(1) better structure to guide and communicate thinking (Walters 1986); (2) increased decision-making capacity (Forrester 1968); and (3) increased rates of learning (Senge and Sterman 2000)." Developing system-oriented models as part of AIM, especially modeling conducted by the management team or the team and selected stakeholders, is considered a means to understand and communicate about uncertainties, complexity, feedback, and nonlinearity within a given wildlife management issue.

Objective setting

AIM approaches are intended to emphasize overt efforts to link fundamental objectives to achievement of stakeholder-defined impacts. As with other aspects of the conceptual framework, AIM documents do not provide a recipe for how to achieve this. The documents do suggest the general practice of using "ends-means linking exercises" to make connections between means, enabling objectives, fundamental objectives, and impacts more explicit.

Selecting, implementing and evaluating alternatives

As with other aspects of the decision-making cycle, Riley et al. (2003) encourage managers to reflect upon stakeholder-defined impacts when selecting action alternatives.

> "The key consideration is to continually analyze any proposed intervention (enabling objective) in terms of the fundamental objectives (impacts) expressed by stakeholders." (Riley et al 2003:91)

Monitoring within an AIM approach focuses on how, why, or to what degree a management intervention achieves desired changes in impact levels. The label "adaptive management" can only be applied to an approach if managers monitor outcomes such that they can learn from their actions, and adapt their enabling objectives or actions as needed to attain fundamental objectives.

Monitoring within an adaptive management approach can be done at two levels of intensity (Meffe et al. 2002). Using the most intense (active) approach, managers can treat interventions as learning experiments that allow for revision of quantitative models of problem system behavior. There are a number of recognized constraints that make it difficult for agencies to fully implement active adaptive management (Enck et al. 2006, Feldman 2008). The developers of AIM recognized these constraints and expected active adaptive management to occur infrequently in wildlife agencies. Passive adaptive management (Meffe et al. 2002) is less onerous and offers a second approach to monitoring. In a passive mode, managers monitor system changes to estimate the extent to which levels of impacts change after a management intervention. "Passive adaptive management is at minimum the use of analyzed experience (evaluation) to inform decisions about maintaining a course of action, modifying it, or stopping it altogether and replacing it with a better alternative" (Decker et al. 2008a).

Stakeholder engagement

Decision making may have been simpler for wildlife managers in the early decades of the profession, when wildlife agencies served a short list of "clients" (e.g., farmers, hunters, trappers) (Decker et al. 1996). In those early days, a passive-receptive approach to stakeholder input (Decker and Chase 1997) may have given wildlife managers enough information to craft decision frames in terms of the values and interests of their key stakeholders. The traditional way in which wildlife professionals framed decisions might be described as an "expert representation" approach (Figure 2.2). Agency staff considered what they knew about impacts based on their experience with traditional stakeholders, volitional input of interested parties, reading of media viewpoints, and sense of professional opinion on the issue at hand. A small group of staff, perhaps just one administrator, framed the decision alone.

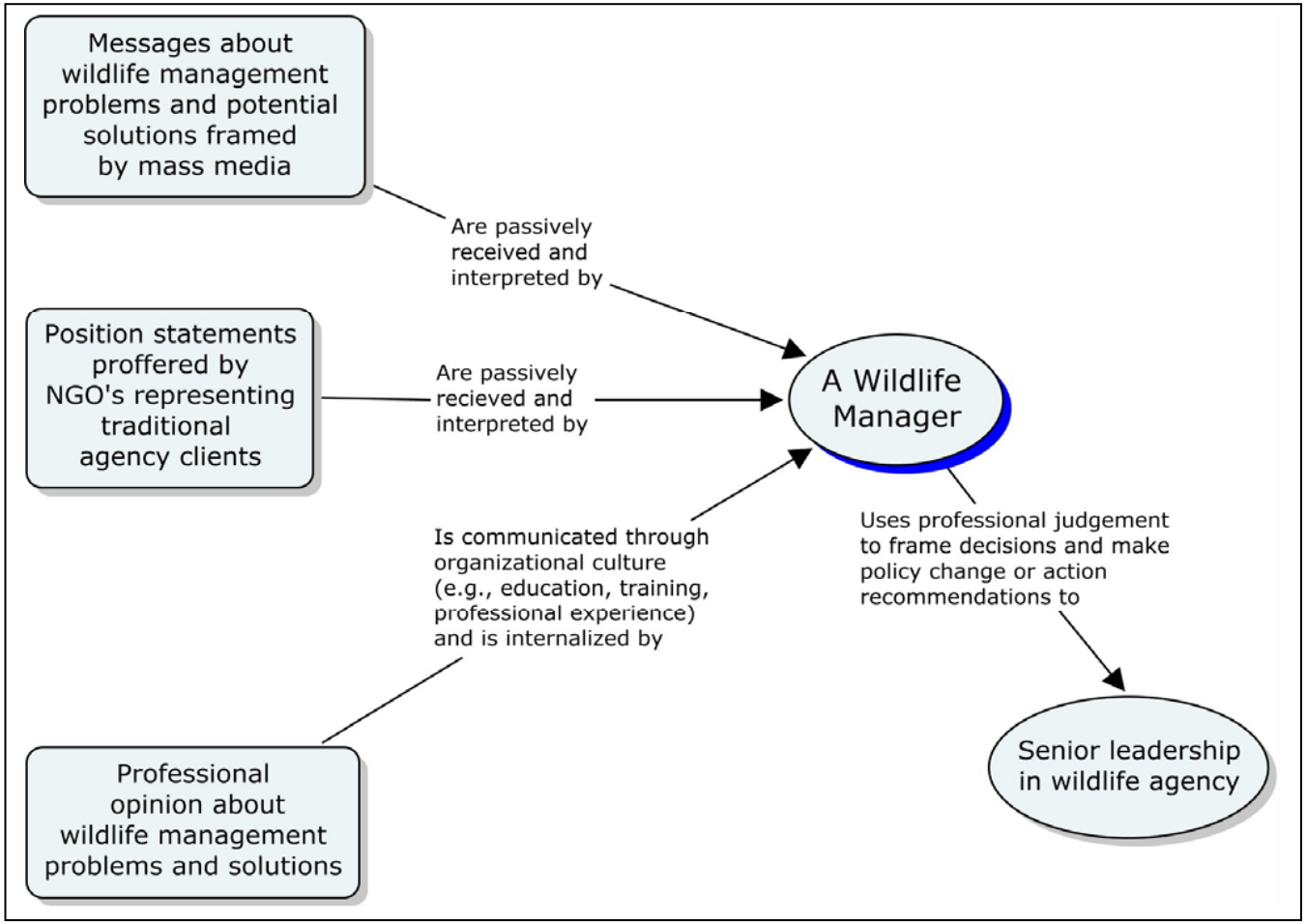

Figure 2.2. A schematic characterization of the expert representation approach to stakeholder engagement and decision framing.

The expert representation approach continues to have a useful place in wildlife management (e.g., when managers are making routine program decisions or making decisions about an issue with little scientific or technical uncertainty). It is inadequate, however, as a response to the most difficult wildlife management decisions: those which include complexity, uncertainty, values conflicts, and stakeholder disagreement about problems and solutions. Public policy analysts refer to these issues as "wicked" or "messy" problems (Allen and Gould 1986, Fischer 2000, Rittel and Webber 1973,Vennix 1999). Scholars like Fischer (1980:32-35) would argue that involving stakeholders in creating the decision frame is essential when dealing with wicked problems, because in these cases the problem itself is a social construction.

Addressing the uncertainty and dynamic complexity of wicked problems requires wildlife managers to integrate multiple sources of information and knowledge (Leong et al. 2007). Among other things, wildlife managers striving to manage a wicked problem need to integrate information on the values and interests of a diverse array of stakeholders when crafting decision frames.

Agencies have responded to wicked problems by stepping up the quantity of public input opportunities they offer. But increase in quantity of input has not been sufficient to meet today's toughest management challenges. Given the need to consider more stakes, contemporary wildlife managers, compared to their predecessors in the first 50 years of the profession, face a much greater challenge when framing their decisions. Implicit in the AIM approach is a belief that substantive advances in the quality of stakeholder input for decisions (not just the quantity of input opportunities) are needed to achieve integration.

A new approach to decision framing

AIM represents a new philosophy, purpose, and method for decision framing that Riley et al. advocate as a means for wildlife professionals to work through the many difficult choices they face as managers of a public trust resource. AIM

advocates concerted efforts to understand and consider a full range of impacts perceived by program stakeholders (Riley et al. 2002). The need for better information on stakeholder-defined impacts necessitates that managers take a transactional approach to stakeholder engagement. I contend that a practice of AIM represents a new, "informed transactional" approach to stakeholder engagement and decision framing by wildlife managers (Figure 2.3). In an informed transactional approach, wildlife managers would form interdisciplinary teams, which would conduct a comprehensive situation analysis to understand discourse in mass media, discourse from traditional stakeholders, and discourse from nontraditional stakeholders. As pointed out early in the chapter, this level of situation analysis is substantively different than the lighter analysis practiced in the expert representation approach (traditionally, professional opinion served as the situation analysis, and the quality of analysis that went into that opinion varied from manager to manager or management team to management team). In an informed transactional approach, situation analysis involves inquiry to understand impacts and how stakeholders form perceptions about what constitutes an impact. In this approach, managers and stakeholders work together to frame decisions. The information base that results from an informed transactional approach would provide management teams a rich information base that they could use to craft models of their management system. Management teams could use information gathered through an informed transactional approach to enhance internal and external communications, making subsequent management decisions more transparent, and perhaps more durable.

Issue education as part of stakeholder engagement

Successful implementation of an informed transactional approach to decision framing would necessitate effective public issue education (PIE) on behalf of, and coordinated with, interdisciplinary teams of wildlife professionals. Public issues are simply issues of widespread public concern (Dale and Hahn 1994, Patton and Blaine

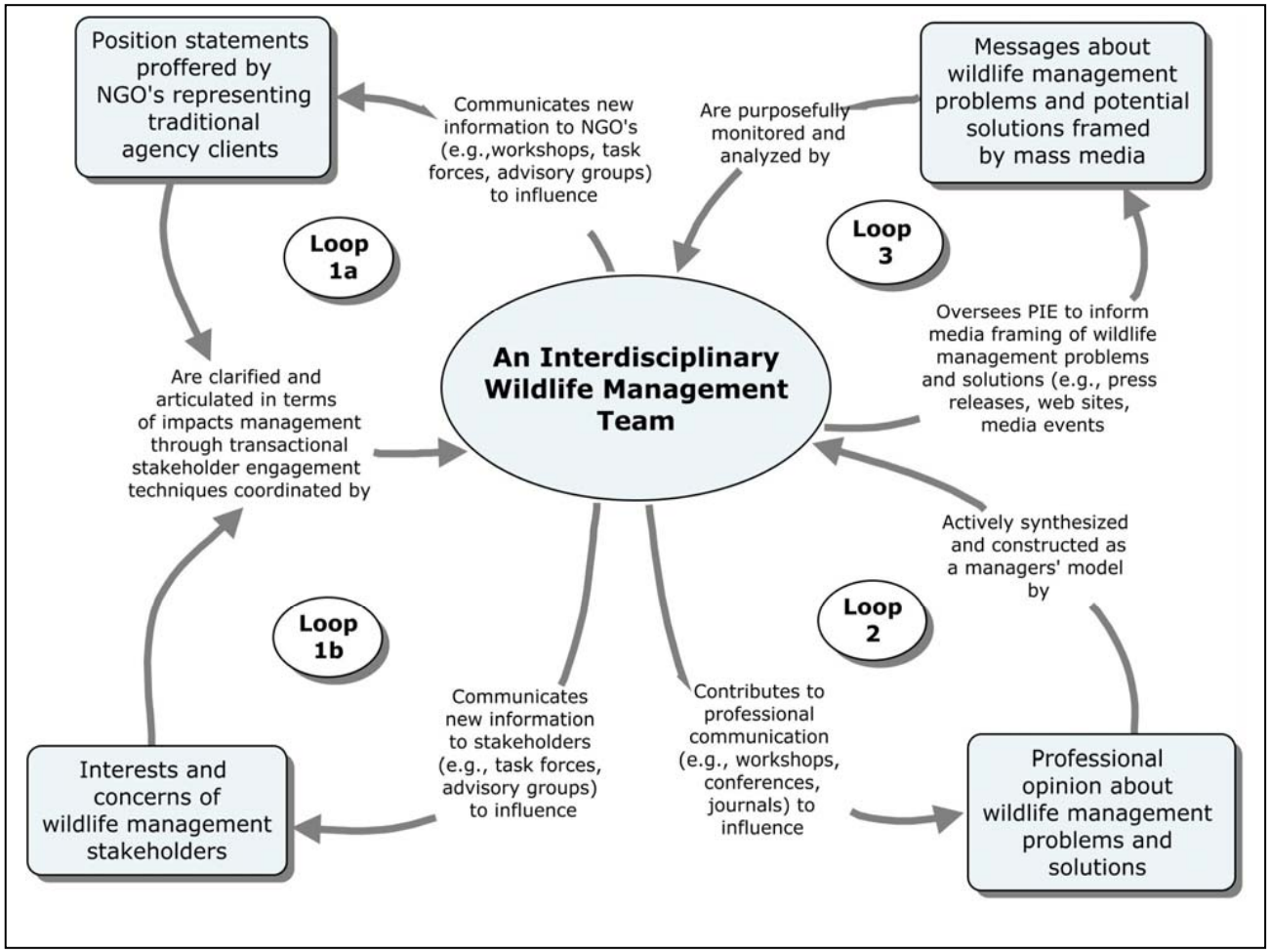

Figure 2.3. A schematic characterization of the informed transactional approach to stakeholder engagement and decision framing.

2001). Public issues education refers to educational activities for the purpose of enhancing society's capacity to understand and address public issues (ECOP 1992).

I contend that three categories of public issues education are called for when managers utilize an informed transactional approach to frame decisions. First, issue education will be needed to stimulate learning within wildlife agency teams. Educational interventions will be needed to help teams of wildlife professionals begin to conceptualize their challenges as public issues to be managed, rather than technical problems to be solved.

Second, in an informed transactional approach issue education will be needed to stimulate learning within the small groups of stakeholder representatives with whom wildlife professionals work during planning processes. Practicing an informed transactional approach to decision framing will not require that all wildlife professionals abandon their biological/ecological roots to become issue educators; it will, however, require that management teams acquire new skill sets sufficient to work with consultants/interventionists who have deeper training as issue educators.

Finally, a third level of public issues education work will be needed to exert influence on public discourse. The informed transactional approach calls for feedback from managers back to media and all management program stakeholders. The purpose of feedback to publics and media is to generate positive change in how publics frame issues as a wildlife management issue continues through stages and cycles of issue evolution.

Integrating biological and social science knowledge

Throughout the brief history of professional wildlife management in the United States some wildlife professionals have recognized that wildlife management is an interdisciplinary field which requires integration of social, political, economic, and biophysical information. For example, Aldo Leopold's writings reveal that by 1935 he recognized that achieving wild land and wildlife conservation goals would only be

possible if he and his contemporaries found a way to integrate understanding of both human and natural communities into decisions about land management (Leopold quoted in Meine 1988: 359-360). He recognized that failure to base land management decisions on consideration of a full range of human values would contribute to impoverishment of wild lands, wildlife, and the human spirit. Unfortunately, the biological and technocratic biases that Leopold and his contemporaries built into the new profession of wildlife management served as barriers to integration throughout much of the 20th century. Internal and external forces of change have reduced some barriers to integration (discussed in following sections). Other barriers remain substantial and represent ongoing challenges for change agents to overcome. As noted in chapter 1, AIM was designed to address a subset of the barriers discussed below.

Professional culture and integration

One barrier to integration of social knowledge bases in wildlife management is a professional culture rooted in positivist scientific traditions and technocratic models of policy implementation (Clark 1992). Professional wildlife management in the United States has roots in the scientific forestry movement (personified by Gifford Pinchot [first director of the U.S. Forest Service] and Bernhard Fernow [director of the first college of forestry in the United States, at Cornell University) and in authoritarian forms of organizational management (Trefethen 1975). Aldo Leopold and other pioneers of the profession took from scientific forestry a great faith in science and technology, and the belief that a small group of elite technical experts could best determine how to allocate public trust resources. "Administrative rationalism" (Schubert 1957) was a dominate philosophy guiding decision making by public policy administrators when these agencies and the wildlife profession were taking form. I would argue that the characterization of administrative rationalism proponents, offered by Schubert (1957:347) as a descriptor of one approach to public agency

administration, is a fair characterization of decision making by wildlife agencies during at least the first half of the twentieth century.

> "For them [proponents of administrative rationalism], the goals of administration are given. The decision-making process is a value-neutral technical process; the authority of the administrator is the authority of expertise. The public interest is found in the rationalization of the decision process so that it will automatically result in the carrying out of the Public Will. Human discretion is minimized or eliminated by defining it out of the decisional situation; responsibility lies in automatic behavior. Science is the *dues ex machine*."

Some change that occurs in wildlife management agencies is the result of internal initiatives to stimulate planned and continuous improvement. For example, change within a wildlife agency can be driven by innovative administrators or middle managers (Wilson 2000, Jacobson et al. 2007), by change in senior leadership or internally-initiated structural reorganizations, by hiring new staff with nontraditional areas of expertise, or by bringing in consultants to train staff. Internal change initiatives (e.g., total quality management [Tachiki 1995]) are rooted in the philosophy that organizations can adapt and improve themselves through additive, incremental changes (Hayes 2007). However, scholars of organizational change have documented that deep structure within longstanding organizations serves to limit the effects of planned change efforts (Gersick 1991). During ordinary times (i.e., periods of relative equilibrium) internal forces for stability are stronger than internal forces for change within organizations. Business management scholars have found that resistance to internal, planned change efforts is especially strong in organizations with strong legal and normative constraints on their activities and relationships (Romanelli and Tushman 1994). State and federal wildlife agencies fit that description.

Though wildlife agencies have adapted and changed over their history as a result of internal change programs, historical review suggests that the internal forces (i.e., historical roots of the profession, professional and organizational culture, and social-psychological factors) also have served as a source of stability that has maintained and reinforced the status quo in those governmental organizations. That translates into continued reliance on established practice, including stability in the practice of basing policy decisions on a narrow, technical information base.

Change has occurred in the organizational culture of wildlife agencies, but external forces have probably driven those changes more than internal planned change initiatives. External forces drive unplanned, rapid, and radical change in organizations that have become maladapted to their operating environment (Hayes 2007).

Changing social organization can result in new or alternative ways of creating knowledge, and that can lead to technological and cognitive changes that are subsequently taken up by government agencies (Wolf, unpublished manuscript). Direct and immediate change is precipitated by both healthy and dysfunctional tensions between wildlife agencies and civil society organizations (Wolf unpublished manuscript). Civil society organizations can get directly involved with agency decisions (e.g., through task forces, input groups, wildlife commissions, etc.) or can affect agencies by exerting political pressure that culminates in law and policy directives that force agencies to change practice.

The environmental movement of the 1970's, for example, was a period of rapid change, when state and federal wildlife agencies were forced to change their organizational culture in response to a flurry of new environmental protection laws (e.g., National Environmental Policy Act, NEPA, 1969; Endangered Species Act, ESA, 1973; Marine Mammal Protection Act, MMPA, 1972; Clean Air Act Extension of 1970; Clean Water Act, 1972; Wild and Free-Roaming Horses and Burros Act of 1971, WF-RHBA; National Forest Management Act of 1976, NFMA; Federal Land

Policy and Management Act of 1976, FLPMA;), many of which included requirements to increase public input to decisions and to consider a broader range of values and stakeholders when making decisions about natural resources (Coggins et al. 2007). Changes in social organization and power relationships, which ultimately led to sweeping law changes in the 1970's, exerted pressure for changes in public input policies within wildlife agencies that have resonated for decades (Mangun 1992). What began as an external force for integration continues to grow within agencies and is becoming an accepted part of agency culture.

Professional identity and integration

Jaffe (1998) argues that professional identity is as an important impediment to organizational transformation in institutions of higher learning (Jaffe 1998). Professional identity also has been identified as an impediment to integration within wildlife agencies. Clark (1992) succinctly described how professional identity hinders the ability of professional wildlife managers to move away from a wildlife biology paradigm and toward a policy sciences orientation that integrates knowledge bases used in decision making.

> …Wildlife professionals most often view themselves as attuned more to animals than people, scientifically rather than socially oriented, technically interested in wildlife populations and habitat rather than decision or policy processes, more skilled in the biological sciences than the social sciences, action oriented rather than contemplative … Wildlifers are seen to fill only a technical role and not one actively involved in the policy process. In short, these views are part and parcel of the professional's identity. Professional norms tell them who they are, what their role is, and set limits for thought and action (Clark 1988). University training and much of later work life in the agencies and elsewhere reinforce these normative perspectives. (Clark (1992:425)

AIM represents a set of process innovations that are not designed to change professional identity. AIM does offer process innovations to that subset of professionals who already have a nontraditional professional identity within the

wildlife management institution. Those nontraditional professionals may have business management or policy training that has cultivated in them an openness to a policy sciences orientation.

Professional training and integration

During the early decades of the 20th century, scientific wildlife management was institutionalized in universities and governments. Seminal writings by Aldo Leopold (Leopold 1930, 1933) established biological and ecological science as the basis for wildlife management decisions in North America, and defined wildlife management as "the art and science of making land produce a sustainable crop of wild game for recreational use." Game management remained the primary project of the wildlife management institution for decades to come, and professionals in the field tended to emphasize biological information as the basis for all management decisions, ignoring all but a narrow set of human values (i.e., values expressed by sportsmen conservationists, hunters, and agricultural interests susceptible to economic losses through crop damage or livestock depredation). The main projects taken on by early wildlife professionals – game management and reducing crop or livestock depredation—reflected 19th century worldviews that were mechanistic, linear, and technocratic.

Into the 1980's, college curricula for future wildlife professionals were designed to produce the biological expertise called for by founders of the profession. The preponderance of university curricula designed for future wildlife professionals continue to place heavy emphasis on natural sciences. Curricula are changing, however. One can now find evidence that wildlife professionals appreciate a need to incorporate more diverse coursework into university curricula, so that future wildlife professionals can do a better job of ensuring that human values are adequately addressed in wildlife management decisions (Gigliotti and Decker 1992, Kessler et al. 1998, Krausman 2000, Nielsen and Decker 1995, Robertson and Butler 2001, Thomas

and Pletscher 2000). In the past 15-20 years, some universities began to diversify their undergraduate curricula for wildlife management majors, or began to offer programs at the post-graduate level to train future wildlife professionals in the social sciences, public policy, public administration, or other "human dimensions" of wildlife management (Shaw 2000, Robertson and Butler 2001).

Agency structure and integration

Difficulties in changing sources of base funding have been identified as a structural element that impedes change within wildlife agencies (Jacobson and Decker 2006). Change in funding sources is an external force (i.e., a political force exerted from outside the wildlife agency) that has a strong potential to change the decision frames used by organizations, because change in funding sources comes with a different set of perceived "clients" or stakeholders. Broader sources of wildlife agency funding tend to lead to greater consideration of nontraditional stakeholders and the value orientations those stakeholders represent (Mangun 1992). For example an initiative called Teaming with Wildlife (TWW) (Franklin and Reis 1996) eventually led to a new source of federal funding for a diverse range of programs for conservation of nongame and threatened wildlife species management activities. Jacobson and Decker (2006) describe how that nontraditional funding source is driving organizational transformation within the wildlife management institution (i.e., how change in funding structure is changing goals [to include actionable goals for a broader array of species], boundaries [by including input from a wider range of stakeholder], and activities within the institution). Agencies which have successfully diversified their funding base (e.g., Missouri Department of Conservation) also seem to demonstrate more integrated approaches to decision making.

Staff composition within most wildlife agencies continues to reflect the historical biological bias of the field, and thus represents a structural impediment to integration. Many staff have expertise in natural sciences and view their organizations

as a source of technical expertise on matters of wildlife biology. Wildlife management policies continue to demonstrate a tendency to define problems and solutions from a scientific perspective (Decker et al. 1991), and wildlife agency programs place a heavy reliance on scientific knowledge (Decker et al. 1991), specifically biological and ecological knowledge developed through a positivist research tradition.

But some staff diversification and professional development has occurred, and with those modest changes opportunities for further integration have been created. Professional interest in retaining an ecological basis for wildlife management decisions has not waned. Yet, professional developments over the past decade also indicate that a critical mass of professionals have come to realize that they need greater integration across disciplines and knowledge bases to meet contemporary wildlife management challenges. For example, senior leadership in most state and federal wildlife agencies now appreciate the need to better integrate human dimensions (HD) considerations into their decisions, a shift in perspective that is evident in their policy statements, press releases, and other public communications. Riley et al. (2003:83) note that the adoption of ideas like ecosystem management and adaptive management are evidence that the profession has recognized a general need for integration. Other expressions of greater interest in HD integration include: establishment of HD units within professional organizations (e.g., HD committee established by the Western Association of Fish and Wildlife Agencies [WAFWA], HD working group established by The Wildlife Society [TWS]; establishment of a dedicated HD section within the Journal of Wildlife Management [JWM]); HD special sessions or entire conferences on HD integration; professional organization sponsorship of publications and workshops on HD integration (Decker et al. 2001 sponsored by TWS; Organ et al. 2006 sponsored by The Wildlife Management Institute [WMI]; integration workshops by HDRU sponsored by the Florida Fish and

Wildlife Conservation Commission and the Western Association of Fish and Wildlife Agencies).

AIM: a process innovation designed to address some barriers to integration

The wildlife profession has made progress toward integration. Nevertheless, the developers of AIM contend that full integration of human dimensions (HD) considerations into decision making has not been achieved and remains a pressing need (Riley et al. 2002, 2003; Organ et al. 2006). Riley et al. (2002:589) assert: "To determine optimal interventions, decision processes must integrate scientifically-derived knowledge as well as experience-based insight about human and biological dimensions."

This section of chapter two has presented developments in the field suggesting that the wildlife profession is moving beyond the question of whether to integrate diverse knowledge bases and is ready to consider innovative approaches to help the profession achieve greater integration. Riley et al. (2003) offered AIM as a practical approach to do just that, with managers who are interested in taking another step on a continuum of organizational change. Riley et al. (2003) assert that better integration of disparate ecological and social knowledge bases will occur as managers address five key concepts: impacts, values, limits and capacity, scale, and decision making (Riley et al. 2003, Organ et al. 2006). They claim that the actual work of integration occurs as managers go through the steps of a structured decision-making process (described in the previous subsections).

The developers of AIM encourage wildlife professionals to form multidisciplinary teams to integrate biological and human dimensions information bases into a comprehensive understanding to support decisions (Organ et al. 2006:89). These teams are expected to provide oversight and direction to research activities in support of the team's situational analysis. Thus, it is these multidisciplinary teams of managers who are expected to do the difficult work of integrating all the information

available (i.e., broad-based scientific research findings [biological and social], stakeholder input, and managers' experience-based insight) to support policy recommendations or decisions about agency actions.

Part II: Premises and Embedded Assumptions of AIM

Riley et al. (2003:83) assert that, "…an adaptive framework, with emphasis on learning through doing and guidance of structured decision processes, offers promise for advancement of decision-making for the most important wildlife issues society faces" (Riley et al. 2003:83). AIM documents (Riley et al. 2002, 2003; Organ et al. 2006) promise a set of benefits that wildlife agencies may realize if they utilize AIM as a guiding conceptual framework to work through their most challenging management issues. Promised benefits include: responsiveness to stakeholder desires for greater participation in decision making processes, opportunities for learning, value-based decision making, increased transparency and durability of decisions, stronger political support for agency decisions and adaptive management experiments, greater ability of wildlife agencies to meet their legal mandates, and greater relevance of wildlife agencies to society (Table 2.1).

A linked set of key assumptions about deliberation, learning, decision framing, and valued-focused decision making help explain why the developers of AIM believe it will deliver these benefits to wildlife agencies (Figure 2.4). Collectively, these linked assumptions are part of an informed transactional approach to stakeholder engagement that contrast with the assumptions and ultimate outcomes of the expert representation approach used historically in the wildlife management profession. The first assumption is that increasing deliberation among wildlife managers and stakeholders (through informed transactional approaches to stakeholder engagement) will increase the potential for learning among both stakeholders and managers. The proponents of AIM assume that as the quality of deliberation is increased, actual

learning will increase, which may lead to consideration of a wider array of values and action alternatives (i.e., may create a broader decision frame). Viewing wildlife management policy issues with a broad decision frame creates a context which encourages value-focused thinking (Keeney 1992:50-51). Value-focused decisions are more likely in a context where the decision frame is broad enough to consider the interests and concerns of a wide array of wildlife management stakeholders (though uneven power relationships or other factors might stifle a focus on values or the full range of values across stakeholders).

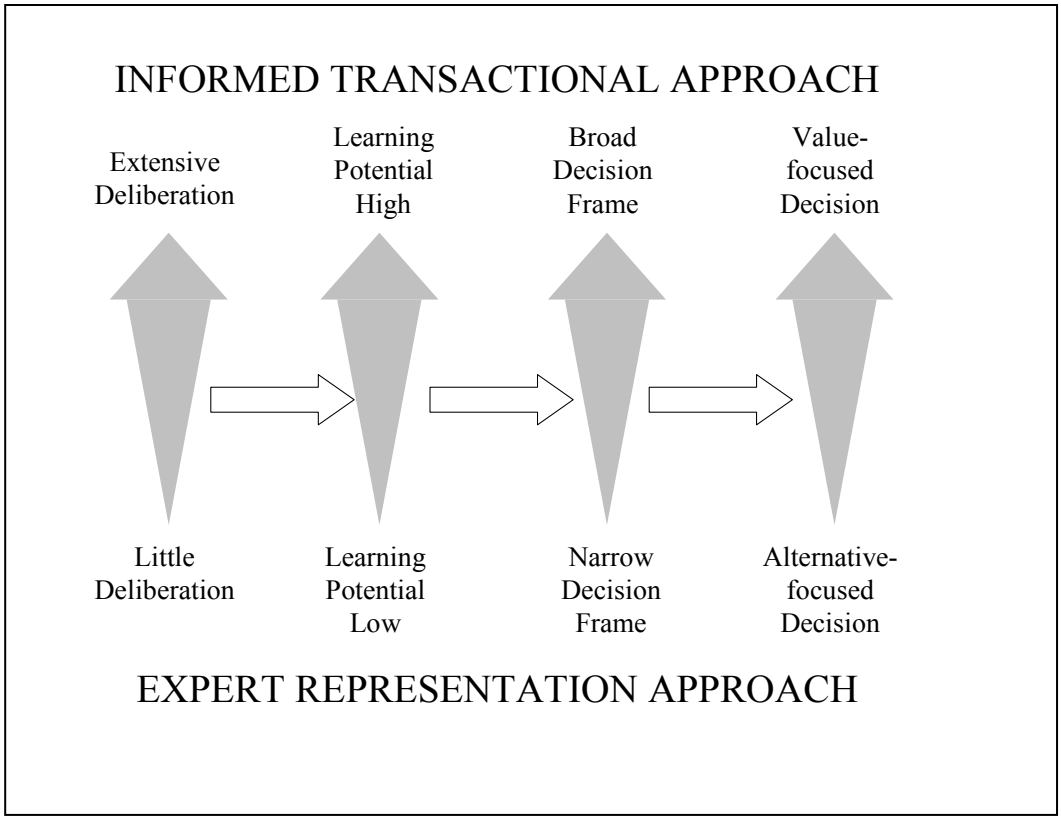

Figure 2.4. Assumed relationships between deliberative decision-making, potential for wildlife manager and stakeholder learning, and decision focus in expert representation and informed transactional approaches to decision framing.

Table 2.1. Benefits promised to wildlife professionals who implement AIM, as stated in foundational publications for AIM.

Use of AIM will:	**Supporting statements**
create new opportunities for learning	"Early and continuous stakeholder involvement encourages shared learning among scientists, managers, and stakeholders" (Riley et al. 2002: 590).
lead to durable fundamental objectives and sustainable actions	"Good decision making [which we think will happen if managers use AIM] results in durable fundamental objectives and sustainable actions" (Organ et al. 2006:94).
respond to a need for integration and growing desire for stakeholder participation in decision making.	"Wildlife management made great strides applying its traditional precepts. Nevertheless, we believe these are being supplanted in practice by new foundational precepts for wildlife management, which reflect a need for integration of multiple disciplines in management and the desire among diverse stakeholders to participate in decision-making (Mangel et al.1996). In this essay, we discuss an emerging paradigm of wildlife management based on precepts of multidisciplinary integration and participatory management, and suggest how to apply them." (Riley et al.585).
help wildlife agencies remain relevant; garner political support for adaptive management.	"We believe that a focus on impacts and stakeholder involvement will direct management toward what matters most to society, which should result in stronger political support for important experimental aspects of adaptive management" (Riley et al. 2002:590). "Because relevant impacts are the primary focus, an adaptive approach – experimental management – should be more readily adopted and implemented by decision-makers such as wildlife commissions than current adaptive management efforts (Walters, 1997)" (Riley 2003:92). "The inclusion of stakeholders in the development and refinement of AIM models, as well as in implementation and evaluation of management interventions, should put wildlife management in a favorable political atmosphere (Chase, Lauber, & Decker, 2001)" (Riley 2003:92).

Table 2.1. continued.

Use of AIM will:	Supporting statements
Produce long-term benefits for stakeholders, wildlife managers, and society.	"When this [adoption of AIM or similar processes] happens, stakeholders will be more satisfied, wildlife managers will find their work more rewarding, and wildlife agencies will be better able to meet their legal mandates. Society will be better served by wildlife managers who adopt a management perspective that integrates human and ecological dimensions, engages stakeholders in all aspects of management processes, and explicitly identifies and pursues impact-focused objectives that reflect human values" (Riley et al. 2002:591). "By focusing on impacts, AIM is expected to have several advantages over current adaptive management approaches: (1) increased relevancy of wildlife management to society; (2) greater stakeholder satisfaction; (3) managers more apt and capable of embracing change and uncertainty rather than avoiding it; and (4) learning becomes a motivator as well as a product throughout the management system" (Riley et al. 2003:92).

I use the remainder of this chapter to describe each of these linked assumptions in more detail. I draw upon literature from a range of disciplines that provide support for these linked assumptions.

Enhancing public involvement stimulates deliberation

The word deliberation appears infrequently in AIM foundation documents. However, an implicit motivation behind recommendations to engage stakeholders in substantive exchanges is that deliberation associated with those exchanges between stakeholders and wildlife agency staff will stimulate learning, better judgments, and ultimately may lead to better decisions. The type of deliberation needed in wildlife management fits the definition of political deliberation advanced by city and regional planning scholar John Forester.

> "By deliberation …I refer to conversations that involve more than the evaluation of efficacy—assessing which options, strategies, or means provide the most bang, the most social benefit for each buck… Political deliberation also involves … two more complex and challenging kinds of practical work: a careful exploration to learn about ends (includes goals, mandates, obligations, hopes, and what these mean in a given case) and a subtle but real recognition of other parties—even as they might propose to build where you want to preserve (or vice versa), even as they bring histories of distrust and feelings of being 'done-to' to the table." (Forester 1999:86)

Forester describes deliberative decision-making as "inquiring and learning together in the face of difference and conflict, telling compelling stories and arguing together in negotiations, coming to see issues, relationships, and options in new ways, thus arguing *and* acting together" (Forester 1999:ix). Deliberative decision making is quite different from the top-down, expert-driven decision-making approach that was the norm in wildlife management a few decades ago (Decker and Chase 1997).

In recent decades, local, state, and federal government agencies have increased their reliance on citizen participation to make decisions on a broad spectrum of natural resource management issues (Beierle 2002). Beierle (2002) systematically reviewed 239 cases of public participation in environmental decision making led by a government agency in the United States since 1970. His analysis provides compelling evidence that stakeholder involvement processes usually contributed to high quality decisions, and that "more intensive forms of stakeholder involvement [e.g., advisory committees using consensus, negotiations and mediations] are more likely to produce higher-quality decisions" (Beierle 2002:747). Many researchers have reported that well-designed processes for citizen participation in natural resource management (including black bear management) can contribute to better decisions by increasing stakeholder knowledge and by improving stakeholder attitudes toward other people and management agencies (Guynn and Landry 1997, Lafon 2002, Lafon et al. 2004,

Landre and Knuth 1993, McMullin and Nielson 1991, Peek 1998, Stout et al. 1996, Wondolleck and Yaffee 2000).

Though public involvement in wildlife management decisions has become more prevalent in recent decades (Chase et al. 2000, 2001), it remains a major challenge for wildlife management agencies (Nie 2004). Wildlife managers occasionally use deliberative involvement processes to make novel, multi-faceted and sensitive decisions. But these high profile decisions are exceptional. For most issues, citizens are afforded few opportunities to interact with agency staff or other citizens in a safe environment where ideas can be exchanged, not only about the biological dimensions of an issue, but also about the human values and impacts that play a role in that issue.

Chase et al. (2001) point out three challenges within wildlife agencies that may effectively limit opportunities for public deliberation of wildlife management decisions. The first challenge is that limits on staff time and financial resources will constrain wildlife agencies even if those agencies have a desire to offer more substantive stakeholder engagement opportunities. Most wildlife agencies don't have the capacity to handle more than a few public involvement efforts at any given time, despite the reality that their broad mandate requires response to multiple, concurrent issues.

Internal resistance may be a second impediment to citizen participation in decision making (Chase et al. 2001). Staff may resist calls for greater public involvement in decisions if they fear that public involvement will erode their agency's authority or control over management decisions. Some analysts claim that government agencies sometimes set out to exclude public input and act autocratically to push forward policy based on the personal agenda of the agency's administrators. Fischer (2000:228) for example, suggests that, "In efforts to dodge legislators, judges,

journalists, and interest group leaders, managers attempt to manipulate the system to achieve what they *see* as the most desirable policy."

The bureaucratic structure of an agency can become a third impediment to greater public involvement in decision making (Chase et al. 2001). For example, Landy (1995) and Nie (2004) point out that the structure of some government agencies allows them to be captured by a few privileged interests, and once captured those interests can exert pressure on the agency to minimize opportunities for other interests to become involved in decision-making processes.

Implications for research. One of the practical questions that proponents of AIM must address is, can practitioners and advocates of AIM overcome impediments (i.e., resource limitations, staff resistance, organizational structure) that keep wildlife agencies from providing opportunities for public deliberation of wildlife management decisions?

Deliberative stakeholder engagement will enhance learning and improve decision frames

Mezirow (1995:49) defines learning as "the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one's experience in order to guide future action." Several of the promised benefits of implementing AIM are contingent on the degree to which AIM can stimulate various kinds of learning by both managers and stakeholders. Deliberative engagement processes are believed to hold the capacity to stimulate three kinds of learning: instrumental, communicative, and transformational. Each type is discussed below.

Deliberation as a tool for instrumental and communicative learning

Forester (1999) describes deliberative practice as pragmatic and politically critical for professionals engaged in city planning or environmental planning

decisions. Forester's work would suggest that wildlife professionals should implement deliberative approaches to stakeholder engagement to:

Learn about issues. To learn not only about "facts," and strategies (i.e., to encourage instrumental learning [Mezirow 1995:49]), but also to learn about value, "asking what ought to be honored, protected, sustained, or developed – what, practically, should be done" (Forester 1999:1).

Learn about others. To use reflective discourse to learn about people – their fears, angers, suspicions, personalities, values, and worldviews. To learn what people care about, "what really burns them," and what they will fight to keep (Forester 1999:79). In the language of Mezirow, this is communicative learning – "understanding what somebody means or the process by which others understand what you mean" (Mezirow 1995:49). Communicative learning "involves understanding values, ideals, feelings and normative concepts like freedom, autonomy, love, justice, goodness, responsibility, wisdom, and beauty" (Mezirow 1995:49). Within an AIM approach, reflective discourse should be used as a means to learn about the effects of wildlife and wildlife management that matter to people (what Riley et al. [2002] refer to as impacts). This kind of learning is essential for value-focused thinking.

Learn how to listen. To encourage "constructivist" listening, a form of listening that will encourage people involved in deliberations to express thoughts and feelings and critically reflect on those thoughts and feelings to create new meaning and "respond creatively to situations rather than rely on habit or rigid strategies" (Weissglass 1990:356). This is the kind of learning that is necessary for individuals to transform their meaning structures or meaning perspectives (described in greater detail below).

To learn about what we should do, and also about what we can do. To expand the range of action alternatives based on a better understanding of others and upon development of new capacities created through the development of new relationships

and social networks (e.g., development of what some refer to as social capital [Portes 1998]). In other words, wildlife professionals need to be deliberative to get past a narrow definition of alternative responses to a wildlife management problem.

Deliberation as a tool for transformational learning

A key advantage of transactional engagement, in contrast to authoritative engagement approaches, is the opportunities that deliberative interaction creates for learning by wildlife managers and management stakeholders. Particularly important are the opportunities it creates for transformative learning. Many transformative learning experiences involve critical discourse (Mezirow 1995:53), and wildlife agencies can stimulate critical discourse by orchestrating deliberative processes.

Mezirow (1995:49-50) differentiates among four types of learning: (1) learning within meaning schemes, (2) learning new meaning schemes, (3) transforming meaning schemes, and (4) transforming meaning perspectives. Types 1-2 represent instrumental learning. Types 3-4 are what Mezirow describes as transformative learning. Transformative (or transformational) learning involves "dramatic fundamental change in the way we see ourselves and the world in which we live" (Merriam and Caffarella 1999:318). People who have experienced a transformative learning experience think differently *and* behave differently because of their experience. Instrumental learning is by far the most common type of learning. One of the questions facing proponents of AIM is, can a practice of AIM stimulate transformational learning by agency staff or management stakeholders?

Mezirow (1990, 1991) suggests that opportunities for transformational learning are created when the learner faces some kind of crisis (a disorienting dilemma [Mezirow 1997]) which the learner simply cannot resolve using old ways of thinking and behaving[1]. The crisis situation may force the learner to go through the multiple

[1] Mezirow and others now recognize that a disorienting dilemma is not the only possible stimulus for transformative learning (Taylor 1997), but it is a common catalyst for transformation and one that

phases of transformative learning, which can be summarized as: (1) critical reflection that makes the learner question their basic beliefs, assumptions, and value judgments; (2) discourse with other people about basic beliefs and assumptions; and (3) changes in one's frame of reference that are expressed through new behaviors or "reasoned reaffirmation" of an existing behavioral pattern (Mezirow 1996:164).

Transformational learning is assumed to take place at both the individual and the social level (individual transformation can contribute to social change and vise versa). Social transformation is often the ultimate goal of public issue education, though this goal may not be stated explicitly. John Forester argues compellingly that, through ritual activities associated with deliberative approaches (e.g., meeting, talking, sharing meals, and listening together), people can undergo transformative learning. Engaging stakeholders in deliberative processes creates opportunities for transformation at a social level, in the sense that such processes build the capacity of communities to actively participate in the resolution of wildlife management problems. Some scholars argue that government agencies may also be transformed by engaging with stakeholders or other agencies as partners in deliberative processes (Franz 2002, 2007). Such transformations are desirable because they are a key to institutional learning and adaptation to changes in the management environment. Collectively, the social transformations generated in individual stakeholders, wildlife management organizations, and nongovernmental organizations who have worked together in deliberative fashion may enhance community capacity to address what had seemed to be intractable issues (e.g., deer-related problems in a densely populated suburb [Raik et al. 2003]).

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creates the circumstances under which members of a community might change the way they define wildlife management problems and potential solutions.

Effective deliberation can create learning that leads groups or individuals to revise their understanding of the problem(s) at hand and broaden the repertoire of possible solutions to those problems (i.e., to broaden their decision frame). Mezirow (1990) describes how discourse can transform people in ways that, if applied to wildlife management, should build the capacity of individuals and communities to create broad decision frames and make sound wildlife management decisions.

> "Meaning perspectives are the lens through which each person filters, engages, and interprets the world. Learning can consist of a change in one of our beliefs or attitudes (a meaning scheme) or it can be a change in our entire perspective. A change in perspective is personally emancipating in that one is freed from previously held beliefs, attitudes, values, and feelings that have constricted and distorted one's life. Perspective transformation, key to transformative learning, is thus defined as 'the process of becoming critically aware of how and why our presuppositions have come to constrain the way we perceive, understand, and feel about our world; of reformulating these assumptions to permit a more inclusive, discriminating, permeable, and integrative perspective; and of making decisions or otherwise acting on these new understandings." (Mezirow 1990:14).

Deliberation holds the promise of improving policy making because it increases the likelihood that citizens will examine issues from new perspectives, so that each citizen can "step beyond the limits of his or her own languages and theories, experiences, and expectations" (Fischer 2000:79). Indeed, policy scholars like Fischer argue that "only through a process of deliberation can policy making be redirected away from an interest-driven policy entrepreneurship toward the public interest more generally" (Fischer 2000:228-229).

Implications for research. AIM applications should be evaluated with regard to learning outcomes for managers and stakeholders. Instrumental, communicative, and transformational learning outcomes should be explored under conditions of actual practice.

Focusing on impacts will lead to more useful decision frames by encouraging value-focused thinking

Riley et al. (2002) assert that stakeholder-defined impacts should be the core concept on which wildlife management decisions are based.

> "We contend the essence of wildlife management is a focus on the positive and negative impacts of wildlife with respect to people (i.e., human values). This idea can be captured conceptually by 2 key precepts and one core concept. Precepts for effective wildlife management are multidisciplinary integration and participatory management. The core concept is impacts (i.e., stakeholder-defined important effects of wildlife with respect to people). Taken together, these concepts should better enable wildlife managers to serve society." (Riley et al. 2002:591)

An AIM approach revolves around stakeholder-identified impacts because impacts are the product of human values, and the goals of wildlife management are grounded in human values (Decker and Goff 1987, Decker et al. 2001). The fundamental objectives underlying wildlife management decisions and management actions should be an expression of those values (Underwood and Porter 1991, Riley et al. 2002). Enabling legislation and wildlife agency goal statements reveal a clear intent to focus state wildlife agencies on the problems and opportunities valued most by citizens, but that intent is not always realized in practice. Too often the fundamental objectives of a given wildlife management program are ill defined or weakly tied to management actions. In many cases the specific policy statements that guide wildlife management programs focus instead on what Keeney (1992) calls enabling objectives, or means to an end (i.e., they specify how some end should be achieved rather than specifying the desired end state).

Wildlife managers can become preoccupied with management techniques (means), which may have been the emphasis of preprofessional training for many, rather than management goals (Fraser 1985:183). Focusing on management techniques is indicative of "alternative-focused thinking" (Keeney 1992:48-49), an approach to decision-making that AIM proponents believe unnecessarily constrains

the quality of management decisions made by wildlife agencies. Alternative-focused thinking is appropriate for many routine decisions made within wildlife agencies, but it has limitations which make it ill-suited as an approach to resolving more complex policy decisions. Focusing on alternatives too quickly (before problems are carefully defined based on a full consideration of values) denies the decision-maker an opportunity to thoroughly evaluate the potential of alternative actions to achieve value-based fundamental objectives. This increases the risk that policy decisions will focus on the wrong problems or an incomplete set of possible action alternatives for the decision-making context (Keeney 1992). In essence, alternative-focused thinking tends to create inappropriately narrow decision frames. Riley et al. (2002, 2003) suggest that an AIM approach will create better decision frames by encouraging value-focused thinking. The underlying assumption is that value-focused decisions are promoted when managers create a decision frame by clearly articulating fundamental objectives based on stakeholder-defined impacts, and articulating the relationships between fundamental objectives and agency actions.

Implications for research. Assumptions about an impacts focus for wildlife management raise multiple research questions that must be answered to evaluate the utility of AIM for wildlife agencies. Some of the most basic questions include the following: (1) does experience of managers who practice AIM support the assertion that focusing on impacts will be useful?; (2) does a focus on impacts influence decision frames?; (3) can a focus on impact management deliver the benefits promised in the AIM documents?

Use of systems thinking will improve the process of decision framing

Systems thinking should help wildlife agencies reach the promises of AIM by helping professionals manage the complexity and uncertainty of their decision-making environment. Natural resource management takes place within ecological and social systems that are dynamic and nonlinear (Holling et al. 1998). The field of system

dynamics (Forrester 1968, Sterman 2000, Hannon and Ruth 2001) and the practice of systems thinking (Senge and Sterman 2000, Morecroft and Sterman 1994, Richmond 2001) were developed to improve decision-making under such conditions. Richmond (2001:3-34) defined systems thinking as a set of eight skills that help people construct better mental models, simulate them more reliably, and communicate them more effectively.

In recent years, facilitated group model building has emerged as an educational and decision-support tool in natural resource management arenas. Vennix et al. (1997:103) state that, "Model building is now increasingly seen as a method to structure debate and to create a learning environment in which assumptions and strategies can be surfaced and tested." Involving stakeholders and policy makers in the process of model building is critical in a group modeling project, because system dynamicists have learned through experience that "most of the learning takes place in the process of building the model" (Vennix et al. 1997:103).

As system dynamicist Krystina Stave explains,

> "… system dynamics offers a consistent and rigorous problem-solving framework for identifying the scope of the problem, eliciting participant views about problem causes and system connections and identifying policy levers When simulation models are built, they can provide an internally consistent tool for comparing the effects of alternative policy options." (Stave 2002:143)

Stave (2002) identifies five characteristics of a system dynamics approach that can improve public involvement in policy decision making. Using a system dynamics approach for stakeholder engagement: (1) creates a problem focus (some public involvement approaches take on a solution focus immediately and the problem is never clearly defined); (2) guides stakeholders to look for problem causes within (endogenous to) the system being examined; (3) focuses on public policy levers that can be used to address the problematic behavior of the system; (4) includes feedback

mechanisms that increase the rate and amount of learning by stakeholders and decision makers; and (5) results in documentation of assumptions, choices, and consideration of stakeholder input.

Others have noted the important role that systems modeling can play in adaptive management approaches. For example, Lee (1999:5) argued that, "The essence of managing adaptively is having an explicit vision or model of the ecosystem one is trying to guide." Stakeholders seldom have a common understanding of ecosystems or an understanding that can be communicated in a common language. Both conditions make communication difficult. Modeling, especially when done in a group setting, helps organize and communicate the key dynamics of a management system to resource managers, decision makers, and stakeholders (Andersen et al. 1997, Bosch et al. 2003, Starfield 1997, Van den Belt 2004, Vennix 1999).

Model development also exposes important uncertainties about a wildlife management system (Starfield 1997). Wildlife management systems are complex and multi-faceted. Social psychology research shows that people tend to perform poorly when trying to predict the behavior of such systems (Kahneman et al. 1982). Many facets of the management system may not even be recognized, let alone understood. Models can be useful to managers as tools for describing, integrating, and understanding interactions between key elements of a wildlife management system. Odell et al. (2005), For example, demonstrate how development of a conceptual model depicting human-horseshoe crab interactions was useful to help identify and clarify (graphically depict) four specific bases for conflict underlying horseshoe crab allocation in Delaware Bay and Cape Cod Bay. Their integrated biosocial model helped identify where conflicts between stakeholders might be based in biological and social information gaps, differing worldviews, or socioeconomic differences (e.g., class conflicts) previously unrecognized in public policy debates, as natural resource

managers focused exclusively on biological and economic dimensions of crab allocation decisions.

Explicit systems models facilitate organizational learning (Richmond 2001:33; Vennix et al. 1997) – they capture institutional knowledge and make it available for critique and continuous improvement. Models encourage examination of proposed management interventions, and help define acceptable sets of management options carried forward through the policy process (Carpenter and Gunderson 2001). During a modeling activity, assumptions behind policy changes will be explicit and subject to additional evaluation and improvement. Modeling also leads to systematic identification of information deficiencies that can be addressed by research. A decade ago, Starfield (1997) argued that small, focused ecological models could be an invaluable tool for adaptive management. He saw it as imperative that wildlife professionals develop the skills to use small, focused models as a routine decision-making aid. He asserts, "In a society where wildlife managers are held accountable and where decision making is subject to public scrutiny, the question is not whether to model, but rather how to model usefully and efficiently" (Starfield 1997:261).

Implications for research. There is reason to believe that encouraging system thinking skills may help wildlife managers explore a broader set of alternative responses to recognized problems (Carpenter and Gunderson 2001). This working assumption should be challenged under conditions of actual practice. AIM applications that incorporate systems thinking or systems modeling should be investigated for their potential to: (1) document managers' assumptions about problem systems; (2) integrate different discourses on wildlife management, (3) increase deliberation among managers and stakeholders, and (4) increase the amount and rate of learning by wildlife management agencies and wildlife management stakeholders. Perhaps the most basic question in this area is, can managers effectively implement systems thinking exercises under conditions of actual practice?

Summary and Links to Case Research Questions

Organ et al. (2006) argue that the core work of the wildlife manager is to integrate biological and social science knowledge, involve the public in management decision making, and to design effective decision processes that identify and differentiate between fundamental and enabling objectives (ends vs. means or strategies to achieve ends). AIM was proposed as a guiding framework wildlife managers can use to accomplish those core tasks.

The AIM concept represents a set of innovations in wildlife management as a decision-making process. The structural components of an AIM decision-making process include: situational analysis, objective setting, model development, identification and selection of alternatives, management interventions, monitoring, and adjustment to models and management. AIM builds on traditional decision-making approaches by adding three interrelated innovations: (1) a focus on stakeholder-defined impacts as the basis for setting fundamental objectives; (2) use of systems thinking or systems models to inform decision making; and (3) reliance on an informed transactional approach to stakeholder engagement and decision framing.

Decision framing is a central activity within AIM. A decision frame consists of the values and action alternatives that are considered in a decision. Practicing wildlife managers do not mak²□□□licy decisions directly. Rather, they construct decision frames for the policy and agency action recommendations they make to senior leadership in their agency. Decision frames establish direction for successive management efforts.

Crafting a decision frame begins with situational analysis that includes, among other things, identifying and clarifying stakeholder-defined impacts. Impacts are stakeholder-defined important effects resulting from interactions among people, wildlife, and wildlife habitat. Identifying and clarifying stakeholder-defined impacts is paramount in AIM and requires more depth of analysis and more interactive,

deliberative stakeholder engagement than managers typically employ when they utilize an expert-authority approach to decision framing. For example, in an AIM approach, understanding how impact perceptions are formed or influenced can become part of a useful situational analysis. Research on stakeholders' media exposure, personal experience, and interpersonal communication may be a useful part of situational analysis because all three are thought to influence formation of impact perceptions by stakeholders.

Systems thinking is suggested as a specific type of decision support activity within AIM. Developing system-oriented models as part of AIM, especially modeling conducted by a project management team or the team and selected stakeholders, is considered a means to understand and communicate about uncertainties, complexity, feedback, and nonlinearity within the system generating a given wildlife management issue. The developers of AIM argue that systems thinking is a powerful learning tool, and a key element within a truly adaptive approach to management.

The developers of AIM encourage wildlife professionals to form interdisciplinary teams to integrate biological and human dimensions information bases into a comprehensive understanding to support decisions. These interdisciplinary teams are expected to do the difficult work of integrating all available information (i.e., broad-based scientific research findings [biological and social], stakeholder input, and managers' experience-based insight) to support policy recommendations or decisions about agency actions. AIM proponents contend that focusing on limits and capacity, scale, and impacts (as a surrogate for human values) will help these management teams to move closer to the ideal state of full integration.

AIM documents promise a set of benefits that wildlife agencies may realize if they utilize AIM as a guiding conceptual framework to work through their most challenging management issues. Promised benefits include: responsiveness to stakeholder desires for greater participation in decision making processes,

opportunities for learning, value-based decision making, increased transparency and durability of decisions, stronger political support for agency decisions and adaptive management experiments, greater ability of wildlife agencies to meet their legal mandates, and greater relevance of wildlife agencies to society. Two conditions must be satisfied to expect the promised benefits of AIM. First, key elements of AIM must be implemented as proposed in AIM foundational documents. Second, the underlying assumptions of AIM must be valid in the context of actual practice by wildlife management agencies.

This chapter describes a linked set of key assumptions about deliberation, learning, decision framing, and valued-focused decision making that help explain why the developers of AIM believe it will deliver promised benefits to wildlife agencies. Collectively, these linked assumptions are part of an informed transactional approach to stakeholder engagement that contrast with the assumptions and ultimate outcomes of the expert representation approach used historically in the wildlife management profession.

The first underlying assumption is that increasing deliberation among wildlife managers and stakeholders (through informed transactional approaches to stakeholder engagement) will increase the potential for learning among both stakeholders and managers. The proponents of AIM assume that as the quality of deliberation is increased, actual learning will increase, which may lead to consideration of a wider array of values and action alternatives (i.e., may create a broader decision frame). It is assumed that viewing wildlife management policy issues with a broad decision frame creates a context which encourages value-focused thinking. Finally, it is assumed that valued-focused decisions are more likely in a context where the decision frame is broad enough to consider the interests and concerns of a wide array of wildlife management stakeholders. The interlinked assumptions are critiqued in case study findings chapters 5-7.

CHAPTER 3

DESCRIPTION OF THE CASE AND METHODS FOR CRITICAL REFLECTION

Introduction

My work utilized case study research methods (McCutcheon and Meredith 1993, Yin 2003, and Hancock and Algozzine 2006) to gain insights about a process innovation in wildlife management. In this chapter, I review the concepts of innovation adoption and implementation and innovation, and I outline the parameters of the case. I then describe my research design, including data collection methods used to address specific research questions within three embedded units of analysis.

Innovation Adoption and Implementation

Innovation adoption is conceptualized as a multi-stage process (Rogers 1995). Scholars have developed source-stage models and user-stage models to describe the process from the perspective of the innovation developer or the innovation user. My case research is informed by user stage models; it follows a set of innovation users (i.e., a team of wildlife managers) through stages of innovation adoption and implementation defined through multiple studies of innovation in organizations.

Innovations are defined simply as technologies and processes that are being used for the first time by members within an organization (Nord and Tucker 1987). Innovation adoption is generally defined as the point when organizational leadership makes a formal decision that their organization will use a new technology or process. Innovation adoption is influenced by perceived innovation characteristics (i.e., relative advantage, compatability, complexity, trialability, observability, and uncertainty (Rogers 1995, others); adopter characteristics (e.g., organization size, structure, and innovativeness); efforts to market the innovation (e.g., targeting the innovation for a specific user group, communication about the innovation, efforts to reduce risk to the

innovation user); social networks ; and environmental influences (Framback and Schillewaert 2002).

The innovation decision is preceded by an initiation stage (e.g., awareness, consideration, intention) and is followed by an implementation stage (e.g., a period involving organizational staff choices about trial use and continued use of the innovation). Effective implementation is a prerequisite for innovation effectiveness. Implementation effectiveness is influenced by climate for implementation and innovation-values fit (Klein and Speer Sorra 1996). Klein and Speer Sorra (1996:1070) propose how the outcomes of innovation implementation may feedback to influence climate for future implementation and innovation-values fit. They point out that "innovation implementation may result in one of three outcomes: (a) implementation is effective, and use of the innovation enhances the organization's performance; (b) implementation is effective, but use of the innovation does not enhance the organization's performance; and (c) implementation fails. This case study explores the determinants and consequences of implementation effectiveness proposed by Klein and Sorra (1996).

The Case

AIM for black bear management in New York

The case I studied was implementation of AIM as a framework for the black bear management program in New York State. I defined the unit of analysis for my work as one full cycle of AIM implementation, where a cycle consists of agency actions representing all the steps in an AIM process as described in Riley et al. 2003 (Figure 2.1).

One of the challenges of conducting case research on a program, process, or organizational change is defining a clear-cut beginning and ending for the phenomenon of interest (Yin 2003:23). By defining my unit of analysis as one full

cycle of the AIM process, I created clear boundaries for my case study. The origins of the case I studied can be traced to situation analysis beginning in 2001 (Table 3.1). The endpoint of the case is less distinct, but does exist in the form of monitoring complaints about problem interactions with bears after management actions were implemented (Table 3.1).

The time boundary for the unit of analysis—2001 to 2008—is the period in which all activities associated with the first cycle of AIM for bear management were completed. Yin (2003:26) recommends that the researcher define a unit of analysis that allows for comparison to previous research. My unit of analysis is similar to that used by Decker and O'Pezio (1989) (and Decker et al. 2001) to develop case study examples of three black bear management cycles in New York State during the period 1970 to 1988. Like the management cycle I studied, those cycles also took place over a multi-year time frame (six years on average).

Organizational setting for the case

Meta-analysis of empirical studies suggests links between organization characteristics (e.g., size, purpose, structure) and adoption of innovations (Damanpour 1992, Kennedy 1983), so it is important to note a few key characteristics of the organization in which the case occurred. The case I investigated took place within the New York State Department of Environmental Conservation (NYSDEC), Bureau of Wildlife. Created in 1970, NYSDEC combined a number of formerly independent agencies and commissions into a single "superagency." By the mid-1990's, NYSDEC had over 3,000 employees and an operating budget of approximately a billion dollars (Nelson Rockefeller Institute of Government 1996).

The Bureau of Wildlife (BOW) is a relatively small subunit within NYSDEC. BOW has approximately 120 fulltime staff divided among a central office (in Albany),

Table 3.1. Components of an AIM process (Riley et al. 2003) and corresponding activities related to black bear management in New York State, 2001-2008.

Component	Related activities in New York
Situational analysis	• HDRU-DEC work to synthesize past stakeholder input • Nominal group meetings with stakeholders in 3 regions • 2002 statewide survey of stakeholders (assessed impacts, etc.) • Stakeholder input group (SIG) process implemented in 4 locations to obtain local insights about impacts • Media content analysis to understand messages about impacts • Regression analysis to examine contributions of media use and personal frame of reference on one kind of psychological impact (bear-related risk perception).
Objective setting	• HDRU-DEC teamwork to define initial objectives matrices. • HDRU-DEC teamwork with SIG participants to craft objectives statements and ends-means matrices (to clarify impacts more than objectives) • Objectives identified by SIG groups were posted on DEC website. • HDRU-DEC teamwork to craft final ends-means matrices
Model development	• AIM workshop with DEC staff (2001) • Group model-building (GMB) with Bear Team (2004 – 2006) • HDRU-DEC pilot test simulator with stakeholder group
Identify, select alternatives	• Bear Team recommendations to senior leadership in agency
Management interventions	• Developed standard operating procedures manual (SOPM) • Changes in hunting regulations • Education pilot program • DEC-sponsored video on bears, preventing problems with bears • Curb service by DEC staff in response to severe problems
Monitoring	• DEC improved record keeping on bear complaints • DEC tallied complaints before and after hunting regulation changes • HDRU assessment of learning outcomes from SIG process • HDRU assessment of learning outcomes from GMB process
Refinement to models or management objectives	• Re-evaluation/revisiting fundamental objectives would signal the start of a new cycle

nine regional offices, and regional suboffices or field stations. BOW is the largest state wildlife agency in the Northeast, but is smaller than many wildlife agencies in the south, Midwest, or west.

Action research: an integral part of the case

Though not labeled as such by agency participants, this case involved some characteristics of action research. Action research is a collaborative method whereby the researcher works with a community to address a problem identified by members of that community. In this case, I worked with a community of wildlife professionals to implement a planned change initiative designed to address a wildlife management problem identified by a team of state wildlife agency personnel. The action research team included professionals at Cornell University, NYSDEC, and Cornell Cooperative Extension.

Action research "explicitly acknowledges both the involvement of the researcher and the role of action in the research process (Kemmis and McTaggert 2000)" (quoted from Plummer 2006:711). "Procedures in action research are recognized as beginning with a planned intervention by the researcher that prompts subsequent iterations of fieldwork or observations, reflections, and the undertaking of new actions…" (from Plummer 2006:711). In this case, the planned intervention was implementation of an AIM process for black bear management. The intervention led to an interative process of stakeholder engagement and empirical research to define effects as impacts and reflect on the wildlife agency's actions to manage impacts. The agency undertook a multi-year, iterative research program to better understand what stakeholders wanted from the management program, then they carefully considered whether their current management actions were achieving the outcomes (i.e., impact levels) desired by their stakeholders. Along the way, they collaborated

with other members of the action research team to implement, evaluate, and revise their stakeholder engagement actions.

Action researchers are viewed as co-learners who do research with and for a community, make their research results available directly to the community, and help apply research insights to the problems that instigated the research (Wadsworth 1998). In this case, research findings came back to the entire group of participants in the form of debriefings, discussion sessions, and written reports, and those findings were used by the team to inform decisions about ongoing stakeholder engagement and agency actions taken as part of the bear management program.

Although I was responsible for design and implementation of the case research, it is important to note that other members of the action research team made substantive contributions to the action project. For example, Daniel Decker contributed to development of the management framework document (NYSDEC 2003a) and SIG structure. Peter Otto and Shawn Riley made important contributions to a quantitative systems modeling process. Tania Schusler contributed to SIG implementation and evaluation.

Research Design

Case study purposes

Case study research can be an effective means to describe phenomena, develop theory, or test theory. My case study had descriptive, exploratory, and explanatory elements, which are embedded in my five study questions (repeated here from chapter 1):

1. How were the principles of AIM implemented in this case?
2. Why were some portions implemented and others not?
3. Does this pilot project provide evidence that AIM or IM hold the potential to deliver outcomes that would improve wildlife agency performance?

4. What do the insights from this case imply for continued implementation of impact management by this agency, and wider adoption of impact management by other wildlife agencies?

5. What do the insights from this case imply for the practice of impact management as a vehicle for public issues education about wildlife management issues?

Because the practice of impact management is not yet in widespread use and a full cycle of impact management has never been described or critically evaluated in the wildlife management literature, there is value in simply describing implementation of impact management by a state wildlife management agency (i.e., there is value in addressing case study question 1). However, I use description of case elements mainly to facilitate exploratory and explanatory roles. My intent was to use description as a means to an end, not an end in itself.

The main purpose of my case research (i.e., answering study questions 3-5) was exploratory. In addition to describing a full implementation of impact management, I employ a range of data collection techniques to explore/challenge key assumptions of adaptive impact management (AIM) in the context of actual implementation by a state wildlife agency. The descriptive and exploratory aspects of my study are intended to inform the theoretical/conceptual underpinnings and practice of impacts management by wildlife agencies.

Finally, I collected data through semi-structured interviews with wildlife agency staff to develop explanations for why particular aspects of AIM were implemented in this case (i.e., data to address case study question 2). Answering such 'why" questions falls into the realm explanatory case research. However, given a single-case design, the explanatory nature of my work was limited to generating hypotheses.

Single-case embedded design

I used a single-case embedded research design (Yin 2003). My work fits two rationales for a single case design. The single case design is appropriate "when the case represents a critical case in testing a well-formulated theory" (Yin 2003:40). The assumptions (theoretical propositions of AIM) are well articulated in Riley et al. (2002, 2003) and this represents a critical case because AIM has not been evaluated in practice.

The single case design is also appropriate "when an investigator has an opportunity to observe and analyze a phenomenon previously inaccessible to scientific investigation" (i.e., when even careful describing the phenomenon would be revelatory) (Yin 2003:42). HDRU's relationship with DEC provided me with unique access to practitioners and stakeholders involved in a full implementation of impact management. My unique opportunity to describe an AIM implementation from the perspective of an inside observer with full access to information and a theoretical framework to guide observations, was a strong rationale for a single-case design.

One also could argue that this single-case approach has merit as a longitudinal case, because Decker et al. 1985, Decker and O'Pezio 1989, and Decker et al. 2001 have described full cycles of bear management planning between 1970 and 1988. Though developed primarily as educational illustrations rather than case research, the earlier work does afford some opportunity to compare and contrast how managers' decisions differed when they were faced with the same tasks over time.

Embedded units of analysis

Within the overall case research approach, I had three embedded units of analysis (i.e., management stakeholders, mass media, and interdisciplinary teams of wildlife managers) (Figure 3.1). Research focused on those three units of analysis enabled me to address the higher level case research questions stated earlier in this

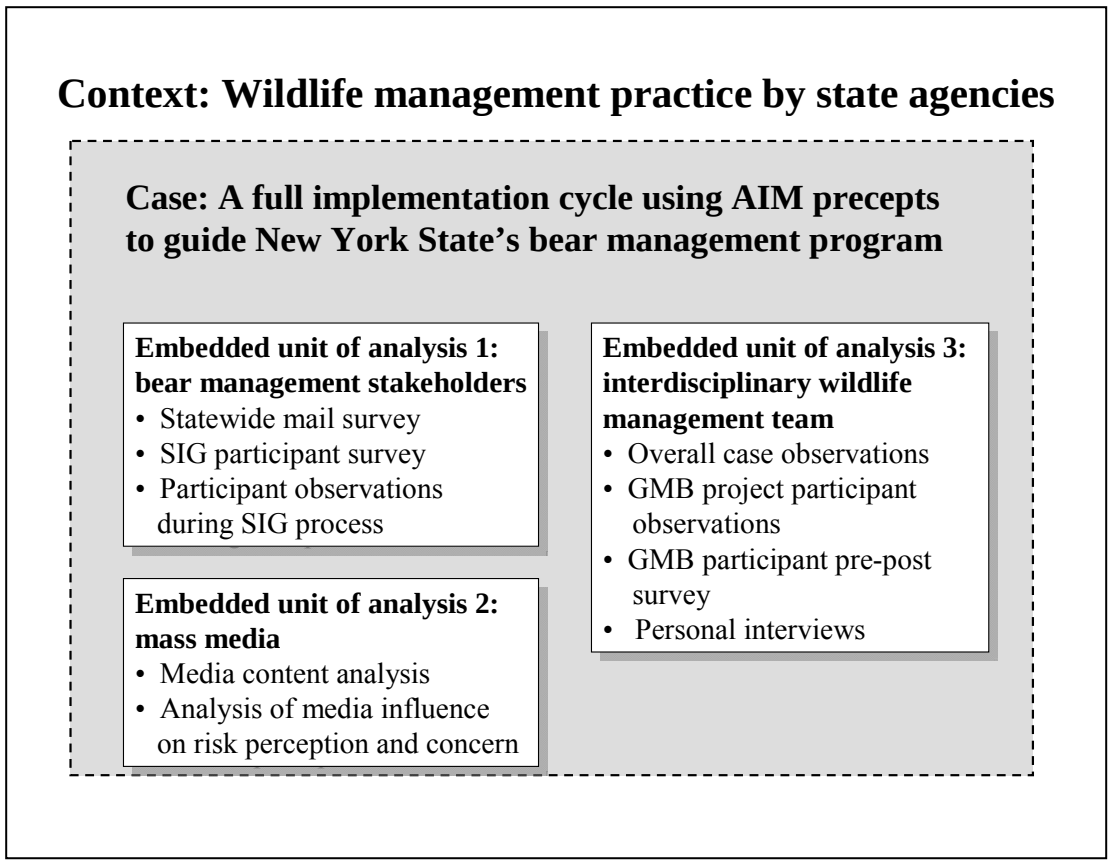


Figure 3.1. A schematic of data collection techniques used for each embedded unit of analysis in a case study of an Adaptive Impact Management cycle for black bear management in New York State, 2001-2008.

chapter. I developed specific research questions within each unit of analysis (Tables 3.2-3.4). As noted earlier, I addressed some of those research questions to support AIM implementation and I addressed others to evaluate AIM implementation. Yin (2003) points out that a common pitfall of single-case embedded designs is focusing on the parts embedded in a case study and losing focus on evaluation of the case as a whole. I address that potential pitfall by concluding each findings chapter with a discussion of the bigger picture (case-level) questions and I devote the last

Table 3.2. Impacts-related research questions and methods used to investigate those questions. Methods used to address research questions in this table focus on embedded unit of analysis 1 (i.e., bear management stakeholders).

Research Question	Data collection strategy
Research to support AIM implementation:	
What effects do stakeholders regard as important enough to label as impacts?	Document synthesis; Previous input synthesis; Nominal group meetings; 2002 mail survey; SIG process implementation;
Research to evaluate AIM implementation:	
Did implementation follow the logic model?	Case description; Documentary evidence;
In what ways did this attempt to implement AIM enhance public involvement opportunities?	Documentary evidence; Case description
To what degree did this attempt to implement AIM stimulate deliberation?	SIG evaluation survey; Case description; DEC staff interviews;
Did deliberation about impacts contribute to learning?	SIG evaluation surveys; DEC staff interviews
How did this attempt to implement AIM influence managers' decision frames?	Documentary evidence; DEC staff interviews
Did this attempt to implement AIM encourage managers to employ value-focused thinking (i.e., did it get managers more focused on ends instead of means?)	Documentary evidence; DEC staff interviews; Comparison to previous management cycles
Why did this case live up to (or fail to fulfill) the propositions (assumptions) of the AIM authors?	Observations; DEC staff interviews

Table 3.3. Media-related research questions and methods used to investigate those questions. Methods used to address research questions in this table focus on embedded unit of analysis 2 (i.e., mass media).

Research Question	Data collection strategy
Research to support AIM implementation:	
How do media frame effects, interactions, problems, and solutions for bear management in New York?	Media content analysis
To whom do media attribute responsibility for creating and resolving bear management issues in media available to bear management stakeholders in New York?	Media content analysis
Is risk associated with the presence of wildlife overestimated in mass media reports available to bear management stakeholders in New York?	Comparision of media content analysis to mail survey data
What role does media exposure and personal frame of reference (e.g., wildlife value orientation, outdoor activity involvement, demographic characteristics) play in wildlife-related risk perception among New York State residents?	Regression analysis using mail survey data
Research to evaluate AIM implementation:	
Did research on media frames and influence of media use on stakeholder perceptions of impacts provide wildlife managers' any relative advantage with regard to AIM situation analysis?	Observations; DEC staff interviews

Table 3.4. System-model-related research questions and methods used to investigate those questions. Methods used to address research questions in this table focus on embedded unit of analysis 3 (i.e., interdisciplinary teams of wildlife professionals).

Research Question	Data collection strategy
Research to support AIM implementation:	
What is the problem that team members wish to address through group model building (GMB)?	Group dialogue workshops
GMB: What system creates the problem defined by the team?	Qualitative modeling; Quantative modeling; Group dialogue workshops
GMB: What wildife agency actions best address the problem identified by the team?	Quantitative modeling Group simulation workshops
Research to evaluate AIM implementation:	
What are the challenges and opportunities of using quantitative group-model-building techniques for issue education with teams of wildlife managers?	Observation; group debriefs; Participant interviews
Can GMB with practicing managers create insights, learning, and consensus about problem definition among a project participants?	Pre-, post-treatment survey of participants
Can GMB with practicing managers lead to a broader consideration of values and management actions than would have occurred otherwise?	Observations; Comparision of DEC documents
Can GMB with practicing managers help involved managers articulate their mental models about the management system, and gain understanding of the relationship between management actions and the impacts they want their agency to manage?	Observation; Pre-, post-treatment survey of participants; documentation of products
Why did this case live up to (or fail to fulfill) the propositions (assumptions) of the AIM authors?	Observations; DEC staff interviews

chapter to discussion of implications the entire case has for implementation of AIM by state wildlife agencies.

Analytic strategies

Yin identifies three general analytic strategies for case research: (1) relying on theoretical propositions; (2) thinking about rival explanations; and (3) and developing a case description. I incorporated all three strategies in my work. My primary strategy was to develop case research around the exploration of theoretical propositions underlying AIM. I also tried to answer "why" questions, by examining theoretical assumptions as an explanation for findings, in comparison to a rival explanation (that implementation failings alone explain the data). Finally, I used case description as a strategy to develop tentative hypotheses about how and why state agencies adopt or implement particular aspects of an AIM process.

Addressing threats to validity and reliability

Yin (2003) reviews study tactics one can use to address concerns about validity and reliability of quantitative case reseach or trustworthiness, credibility, confirmability, and dependability of qualitative case research. The following subsections describe how I applied those recommendations to my work.

Construct validity

Construct validity is established by creating measures that accurately tap into the theoretical constructs one wishes to study and generalize about based on inferences from empirical data. My case research focused on a broad set of constructs, including: informed-transactional stakeholder engagement, learning, organizational change, impacts, deliberation, decision frames, systems thinking, and public issues education.

Yin recommends three tactics to improve construct validity in case research: using multiple sources of information, establishing a chain of evidence, and allowing

key informants to review draft reports. I took multiple steps to implement those tactics as a means to insure construct validity in my research.

Using multiple sources of evidence. My data collection methods included: archival document analysis, observations and participant observations, analysis of survey results, media content analysis, and personal interviews. These multiple methods produced convergent data (data I collected using more than one method to corroborate the same finding about a construct like impacts or learning, i.e., *triangulation*) and divergent data (data I collected using more than one method to explore multiple facets of a concept like decision frame, and later synthesized to draw conclusions). Where quantititative methods were used (e.g., when multi-item indexes of a theoretical construct were created), I also employed appropriate statistical tests of construct validity.

Establishing a chain of evidence. I created chains of evidence by establishing a clear line of connection from: case study questions, to theoretical foundations, to research protocols (i.e., concept-indicator matrices and other protocols that link question operationalization to underlying concepts), to specific evidence presented from the case study database, to the physical documents that comprise the case research database, to case study conclusions.

Review by key informants. I incorporated key informant reviews by asking members of the study team to review draft copies of previous study reports and chapters of this dissertation.

Internal validity

Internal validity only pertains to studies looking for a cause and effect relationship. In my case, I asked questions like, "did the intervention lead to learning?" Improving internal validity in this case means taking steps to question whether an expected outcome of AIM (like learning) is explained by the intervention

or if it is better explained by some other factors. Even to explore rather than truly explain causality, my case research required some means to question whether implementation of AIM led to the outcomes I observed.

Yin recommends three tactics to improve internal validity: pattern matching, explanation building, addressing rival explanations, and use of logic models. I used a combination of those tactics to address considerations of internal validity.

Explanation building. Explanation is a special kind of pattern matching that requires the investigator to determine whether the observed data demonstrate evidence of a presumed set of causal links. This usually unfolds as a series of iterations, where the researcher makes an initial theoretical statement, compares the findings of an original case against that theoretical proposition, revises the theory or proposition, compares other details of the case to the revision, then goes on to compare the revised theory against new cases as many times as needed (Yin 2003). My case research represented a first step in this iterative process.

Rival explanations. One of my basic analytic strategies is to compare two competing explanations for my findings: (1) the findings are explained by implementation strengths or weaknesses, or (2) the findings are explained by theoretical/conceptual strengths or weaknesses.

Logic models. I developed logic models to guide implementation of the stakeholder input group (SIG) process and the group-model-building (GMB) process. I then collected case study data to evaluate whether processes were implemented as designed, and to support or challenge the causal linkages in a program logic model. This improved my ability to critique AIM assumptions, critique the process logic models as an operationalization of AIM assumptions, and speculate about whether the findings I was observing were due to program interventions or were merely spurious correlations with program activities. In combination with the process logic models, I

used chronological listing of events as a basic tool to check internal validity (i.e., events that occurred before an intervention step could not have been caused by that intervention).

External validity

External validity pertains to establishing the domain to which study results can be generalized. Basing case research in a theoretical framework is recommended as a tactic to increase external validity of case studies. In this case, I based my data collection around study questions that explored the theoretical underpinnings of AIM. Because the case was implemented by a state wildlife agency, the conclusions and implications from this work may only be generalized to the domain of AIM application by state wildlife agencies. Moreover, it must be noted that this case included extensive involvement from a team of university human dimensions specialists that may not be available to other state agencies. Success in this type of case does not imply that similar success could be expected in agencies without the same kind of support from human dimensions specialists.

Reliability

Reliability pertains to whether the methods and approaches used by one researcher could be repeated by others and yield the same results. Yin (2003) suggests the use of research protocols to address reliability concerns in case research. I developed research and implementation protocols for multiple facets of my case research (several protocols for research and program implementation are provided as appendices). Where quantititative methods were used (e.g., when multi-item indexes of a theoretical construct were created), I also employed appropriate statistical tests of scale reliability.

Data Collection and Analysis

I used a combination of quantitative techniques (e.g., survey research, media content analysis) and qualitative techniques (i.e., personal observations, analysis of interview transcripts) to generate insights and knowledge claims. Mixed-methods approaches to case research are common (Darke et al. 1998). Some scholars advocate case study research that combines positivist and interpretivist approaches to data collection (Kaplan and Duchon 1988). I used a mixed methods approach because tools from different research traditions had obvious pragmatic advantages in my multi-faceted research project (i.e., my work fits into the scientific paradigm that Tashakkori and Teddlie [1998] label pragmatism).

The following sections describe the purposes for which each data collection technique was used and the analyses performed on each database (additional conceptual and analytical details are presented in chapters 4-6). Because this case involved action research, I describe both the data collection techniques used to support implementation of AIM, and those used to evaluate the assumptions underlying AIM.

Mail survey of bear management stakeholders

The 2002 mail survey provided a range of data to address the first step of AIM: situation analysis. The study was designed to: characterize stakeholder experiences with and tolerance for interactions with black bears; identify factors that influence public perceptions of risk related to black bears; and assess stakeholder attitudes about management response to individual bears in problem situations. Most importantly, the mail survey was designed to improve managers' understanding of impacts and factors affecting formation of impact perceptions.

Questionnaire development and content

In 2001, I worked closely with DEC wildlife managers on the action research team to develop a self-administered, mail-back questionnaire (Appendix A) that would

address the research objectives stated above. That survey instrument included items to assess: demographic characteristics, participation in wildlife-related activities, attitudes toward bears, experiences with bears, sensitivity to interactions with bears, attitudes towards bear management activities, wildlife value orientation, and interests in or concerns about various effects produced when people interact with black bears.

I relied on preliminary input from stakeholders to develop questionnaire items on the effects produced by human-bear interactions. In the fall of 2001, I worked with team members to convene a series of three small group meetings with stakeholders living in core bear ranges. I used a nominal group technique to elicit information about the ways that people are affected by their interactions with black bears (Appendix B). I analyzed information from those meetings to formulate a list of effects people want to obtain or hope to avoid, with regard to black bears. The team integrated that information with insights that agency staff had gained from their management experiences and from previous DEC efforts to obtain public input on black bear management. Combining these sources of information allowed the team to create a reduced list of bear-related effects important enough for further exploration in the mail survey.

Sampling and survey implementation

HDRU staff implemented the mail survey in March 2002, using a standard 4-wave implementation (i.e., all members of the sample received an initial mailing and follow-up reminder letter; nonrespondents received up to two additional reminder mailings, including a replacement questionnaire). Staff conducted the study with a random sample of 3,000 adults living in New York State counties north of New York City. We implemented the survey with subsamples of 600 stakeholders living in each of five geographic areas: (1) the Allegany bear hunting zone; (2) the Adirondack bear hunting zone; (3) the Catskill bear hunting zone; (4) upstate New York outside a bear

hunting zone; and (5) the downstate counties of Rockland and Westchester. The sampling frame included urban centers (e.g, Buffalo, Rochester, Syracuse, Albany).

Four hundred twenty-eight questionnaires were undeliverable, reducing the total sample size to 2,572. A total of 1,036 usable questionnaires were returned, for an adjusted response rate of 40%. The response rates by geographic area were 42% (Adirondack bear hunting zone), 43% (Allegany bear hunting zone), 44% (Catskill bear hunting zone), 43% (upstate areas between bear hunting zones), and 30% (Rockland and Westchester counties).

Given that fewer than half of people in any geographic area responded, a nonrespondent follow-up survey was warranted. I prepared a nonrespondent follow-up interview that was used by the Cornell University Computer Assisted Survey Team (CAST) to complete a 3-5 minute follow-up telephone interviews with 75 non-respondents between June 5 and June 15, 2002.

The follow-up study revealed that, for some background characteristics, the respondent group differed from nonrespondents and from the population of all adult residents of New York State (Appendix C). Respondents were more likely than the population of adults in New York State to be male (62% vs. 47%) and to participate in hunting (25% vs. 5%). I used weighting factors to adjust the data to reflect the actual gender ratio and rates of hunting participation in New York State in 2001. I calculated these weights based on the gender ratio and rates of hunting participation for New York State residents aged 16 and older reported in the 2001 National Survey of Hunting, Fishing, and Wildlife-related Recreation (U.S. Department of Interior and U.S. Department of Commerce 2003). Some analysis (reported later) were conducted with unweighted data.

Telephone survey after a bear-related human fatality

A black bear-related human fatality occurred in New York five months after completion of the 2002 statewide mail survey of bear management stakeholders. To assess possible effects of this event on stakeholders' risk perceptions, the HD research team developed and implemented a telephone survey that was implemented three weeks after the human fatality (more details on research methods are available in Gore et al. 2005). The telephone survey replicated several key questions from the mail survey, including a measure of acceptability of the risk that black bears pose to human safety in New York.

Post-exposure survey of stakeholder input group (SIG) participants

Beginning in 2003, a stakeholder input group (SIG) process was used in locations around the state to provide stakeholder input for DEC's framework for black bear management (Appendix D). The SIG process built upon earlier stakeholder engagement activities conducted by DEC, and were intended to "… help DEC staff articulate area-specific management objectives (based on identified impacts) and related plans of action" (NYSDEC 2003a:17). SIG processes convened in different regions were intended to help DEC staff refine their understanding of regional impact perceptions and acceptability of various bear management options (more detail about the SIG process is provided in chapter 4).

I designed a post-exposure survey of SIG participants to address case study question 3 (i.e., "Does this pilot project provide evidence that AIM or IM hold the potential to deliver outcomes that would improve wildlife agency performance?"). It focused on the context for deliberation, mechanisms to enhance participants' ability to process information, and perceived outcomes for participants (Appendix E). I developed items in these three categories based on recommendations about evaluation design in Pawson and Tilley (1997) and Rouwette (2003).

Implementation. This data collection technique involved stakeholders who had completed full participation in a SIG process implementation, so the survey implementation process was simplified. Participants in each process provided a mail or email address at which they could be contacted, and they were mailed or emailed a copy of the post-participation questionnaire approximately two weeks after their SIG process concluded. Those who did not respond within two weeks were sent a reminder mailing and another questionnaire. Due to the small number of participants, data analysis consisted of tabulating frequency results and making qualitative comparisons of results across implementations of the SIG process in 4 locations.

Analysis of media content 1999-2002

Bear management began to draw increased media attention in New York in the late 1990's as bear sightings in urban areas and events like home entries by bears became more frequent. At that time no efforts had been made to characterize the nature of media coverage of bear management in the state. I suggested that research on media coverage of black bears could help New York State's wildlife managers understand how media were framing problems as bear management was emerging as a public policy issue. Thus, as part of situation analysis for AIM, the team agreed to proceed with a media content analysis to describe how black bear management was characterized in newspaper articles and radio or television broadcasts available to people in New York State between January 1999 and March 2002 (i.e., in the years preceeding the 2002 statewide mail survey of bear management stakeholders).

My analysis focused on how reports using episodic or thematic frames (Iyengar, 1991) differed with regard to problem identification, attributions of responsibility, and proposed bear management solutions. Findings from this work shed light on media coverage at the early stages of public discourse, before interest groups had become engaged in a polarized dispute over wildlife management

practices. Understanding the early stages of public issue evolution can help wildlife agencies better understand and perhaps facilitate productive issue evolution processes. Media content analysis was done to help members of the team understand media messages about bears and bear management, and to help managers understand the relative influence of media consumption on formation of impact perceptions. This research informed the first stage of AIM implementation (i.e., situation analysis).

I completed a content analysis of black bear-related newspaper, television, and radio reports available to people in New York State from January 1, 1999 through March 31, 2002 (i.e., a 3-year period preceding implementation of a statewide survey of black bear management stakeholders in New York [Siemer and Decker 2003]) to assess messages communicated through those channels. I used two criteria to set the article sampling frame: (a) obtaining a relatively large pool of articles/transcripts for analysis; and (b) minimizing recall bias about article content.

I used the LexisNexis academic search engine to identify articles in newspapers and radio or television broadcast transcripts containing the key words "bear," "black bear," and "New York." Lexis-Nexis searches included access to transcripts from: National Public Radio, ABC, CBS, CNBC, CNN, NBC, and Fox. The search engine I used samples only major newspapers and national broadcast transcript services, so our analysis does not cover stories from small newspapers or television stations. I did not attempt to include local radio or television broadcast transcripts in our sample, because the statewide scope of our study would have made that step cost prohibitive.

I identified a total of 213 newspaper articles, 23 television broadcast transcripts, and 7 radio broadcast transcripts containing the key words. Only 117 of those stories focused on black bears as a topic. I screened and excluded articles that contained the word "bear" but focused on other topics (e.g., travel, gardening, art

shows). I used SPSS to analyze the 117 stories that focused on black bears. I grouped articles for comparison and used chi square tests to identify differences between comparison groups (differences reported at $p < .05$).

Coding Protocol

I documented a range of descriptive characteristics for each article/transcript, including: format (i.e., newspaper, television, or radio), date and place of publication or broadcast, article length, and article type (e.g., news, letter, editorial). I read all articles and developed a set of categories for topics discussed across all articles. One coder used that set of topic labels to code the top three topics discussed in each article.

I developed the coding protocol iteratively. After drafting a coding protocol, I trained one research aide to code a set of 20 dummy articles (e.g., related articles printed before 1999). I coded the same articles and then calculated simple agreement between coders on each variable (i.e., calculated the proportion of times coders applied the same code for a given variable and case). I revised the protocol to address coding disagreements and then repeated the process of training, coding, and assessing intercoder agreement. After three iterations, simple agreement level was 90% or higher on most items. The final instrument (Appendix F) consisted of simple yes/no questions that indicated the presence/absence of content. I then trained two coders to use the final protocol. After a training period using the final protocol, both research aides coded the content of all articles for the presence/absence of pre-determined indicators in six categories: (a) bear-related effects and interactions; (b) causes of bear-related problems; (c) solutions to bear-related problems mentioned; (d) news frame (episodic vs. thematic); (e) attributions of responsibility for problems; (f) and attributions of responsibility for solving problems.

Bear-related effects and interactions. Siemer and Decker (2003) identified six broad categories of effects related to black bears in New York: ecological, economic,

health/safety, psychological, social, and management. I developed two to five indicators of effects in each category. Coders recorded which effects were mentioned in each article. I then compared episodic and thematic stories to assess whether they differed with regard to mention of one or more indicators in each effects category.

Problems, solutions, and responsibility. Coders recorded whether articles suggested any of eight potential causal explanations for residential problems with bears or any of six actions as solutions to residential bear problems: teaching people how to live with bears; better waste disposal practices; lethal control of problem bears; relocating bears; establishing or increasing bear hunting; or negatively conditioning bears to avoid certain locations or food sources. I developed these indicators based on information from bear managers in New York and a list of problems and solutions mentioned in news reports I reviewed during the protocol development process.

I developed two items to assess whether articles blamed individuals or the state wildlife management agency for problems with bears. I developed two more items to assess whether articles mentioned that individuals or the state should take responsibility for resolving problems with bears.

News frame. Articles focused on a specific event were classified as episodic. For example, articles about a bear sighting or an event where local police chased a bear through a residential neighborhood were coded as episodic. Human interest stories and descriptive pieces were among those classified as episodic (e.g., a story focused on how a wildlife rehabilitator cares for bear cubs). Articles that included a small thematic element (e.g., a thematic opening or closing paragraph) but were predominantly episodic were coded as an episodic story.

Articles that focused on general conditions or outcomes were classified as thematic. Articles that focused on bear management policies or history were coded as thematic. For example, an article that portrayed increased problems with black bears

as part of a broader pattern of human-wildlife interactions linked to changes in human and bear population increase, changing land use patterns, and forest regeneration over a century, would be classified as a thematic article. A specific event may be discussed in a thematic story, but that event is placed in a significant general or historical context.

Intercoder Reliability Checks

One way of inferring reliability of data from content analysis is to use some metric of agreement in coding decisions by multiple coders. Simple agreement between coders is insufficient as a test of intercoder reliability because such agreement may occur by chance alone (Lombardi et al. 2002). Measures of association and correlation (like Crohnbach's alpha) also are inappropriate indices of intercoder reliability in content analysis (Lombardi et al. 2002). However, there are a few agreement coefficients that provide useful measures of intercoder agreement when used under appropriate conditions. Krippendorf (2004) endorses Scott's pi (Scott, 1955) as an appropriate coefficient of agreement in situations with two coders and nominal data. I tabulated Scott's pi to assess intercoder reliability for each variable. The cut-off point for an acceptable (pi) value is a matter of professional judgment. Krippendorf (2004) argues that a relatively low coefficient is acceptable when the research purpose is hypothesis testing. I applied that reasoning and decided to report findings for variables on which Scott's pi was 0.70 or higher (variables that did not meet the criterion of pi > 0.70 were dropped from the analysis).

Analysis of media content after bear-related human fatality

Gore et al. conducted content analysis of print media stories in the six days following a bear-related human fatality in New York State. This analysis was completed to provide a context for understanding what messages were communicated

to stakeholders after the fatality and how those messages influenced stakeholder risk perceptions. Methods for that content analysis are described in Gore et al. 2005.

Influences of media use on stakeholder perceptions and behavioral intention

Risk perceptions represent a particular kind of impact associated with the presence of black bears. Managing bear-related risks and perceptions people hold about them is particularly important in residential areas. One aspect of situation analysis in this case focused on media use, personal frame of reference, and risk perceptions. Quantifying how exposure to mass media may influence risk perceptions and tolerance for black bear presence is important if one assumes that most people in residential areas will learn about bears indirectly, through mass media.

Wildlife managers may assume that mass media influence public acceptance of human safety risks associated with black bears, but little research has been done to test hypotheses about the relationship between exposure to mass media and perception of bear-related hazards. In this case, I believed that greater understanding of the relationship between media content, media exposure, and risk acceptance would be useful to NYSDEC in understanding and responding to black bear controversies in residential areas. I reasoned that such information would give managers insights about the social climate in which they must make and implement bear management decisions. I suggested that understanding of media effects might also help managers anticipate trends in stakeholder behavior. For example, if media exposure leads people to underestimate human safety risks, individuals may take fewer actions to prevent negative interactions with black bears. If media exposure leads people to overestimate wildlife-related human safety risks, individuals may lose tolerance for bears and reduce their level of support for the presence of bears in their region.

Data from the 2002 survey of bear management stakeholders (described earlier in this chapter) was used to test hypotheses about factors that influence bear-related risk perceptions, concerns about bear-related problems, and predisposition to contact an authority for field response to a human-bear interaction. I assessed whether regression models of acceptance of risk associated with bears could be improved by adding media exposure variables (i.e., newspaper reading, television viewing) to models containing personal attributes (i.e., wildlife value orientation, outdoor activity involvement, demographic characteristics) and personal experiences (i.e., problem experiences with bears) previously found to be predictive of risk acceptability and concern about wildlife-related safety risks.

Measures of dependent and independent variables

Hazard acceptance and concern about hazards (dependent variables). I operationalized hazard acceptance as the degree to which respondents agreed with the statement, "the risk of being threatened by a black bear in New York is acceptably low." This questionnaire item had a 5-point response scale (strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree). I created low and high hazard acceptance subgroups based on the aggregate mean response to these items.

I operationalized concern about bear-related safety hazards as a set of 5 items assessing concern about bear-related hazards (i.e., concern about: being confronted by a bear, being injured by a bear, being injured in a bear-related motor vehicle accident, having a pet threatened by a bear, or contracting a disease transmitted by bears). I used these 5 items to create an index of concern. I tested the internal consistency of the scale by calculating Crohnbach's alpha. All items were highly correlated and yielded a scale with high reliability (alpha = 0.89). Principal axis factoring identified a single factor with an eigen value above 1 (a conventional cut-off point for accepting factors). This factor accounted for 68% of the variance between items. All items

loaded strongly on this factor and no other. Factor loadings were 0.80 and higher. I placed respondents in low or high concern subgroups based on their index scale score (i.e., respondents scoring above the mean scale score were placed in the high hazard acceptability subgroup).

Measures of print media exposure. The information-processing model (McGuire 2001) suggests that both exposure to media reports and attention to those reports are prerequisites to a media effect on beliefs. I designed a media exposure scale with the information-processing model of belief change in mind. I asked respondents to report how many days per week they read a daily newspaper, how often they read newspaper stories about black bears, wildlife, and wildlife management (3 items) and how much attention they paid to stories about black bear, wildlife, and wildlife management (3 items). I used those 6 items on media use to create a multi-item index of media exposure. A reliability analysis showed that all 6 media items should be retained in a media exposure scale. The items were all highly correlated and yielded a scale with high reliability (alpha = 0.94). Dropping items did not improve reliability, so I conducted confirmatory factor analysis with all 6 items. Principal axis factoring identified a single factor with an eigen value above 1. This factor accounted for 73% of the variance between items. All items loaded strongly on this factor and no other. Factor loadings ranged from 0.75 to 0.90.

Media exposure and risk. I created separate measures for print media and television exposure. For purposes of regression analysis I placed people in a low or high print media exposure group based on their print media exposure index score. Those who scored above the mean score for all respondents (3.69 on a scale of 5.0) were placed in a high print media exposure subgroup; those who scored below the

mean were placed in a low print media exposure subgroup. People who didn't read a daily newspaper at all were placed in a "no exposure" subgroup for analysis.

I included just a single item for television exposure (as opposed to the multiple items used to assess exposure to print media). I created television viewing subgroups based on average hours of television viewing per day (i.e., the subgroups were: none, 1 hour, 2 hours, 3 hours, 4 hours, and 5 or more hours.

Measure of value orientation. I used modified versions of 13 items developed by Fulton et al. (1999) to create multi-item indexes of: 1) wildlife benefits orientation; 2) wildlife use/management orientation; and 3) and wildlife protection orientation. All items used a 5-point, bipolar scale anchored by "strongly agree" and "strongly disagree." In addition, each item included a "don't know" response category; respondents who circled that category were not included in analysis of value orientation.

The 13-item index yielded a scale with an acceptable level of reliability (Cronbach's alpha = 0.83). I used confirmatory factor analysis to create value orientation subscales. Dropping items did not improve reliability, so I conducted confirmatory factor analysis with all 13 scale items. Principal axis factoring with varimax rotation identified 2 factors with an eigen value of 1 or greater, and a third factor with an eigen value of 0.9. A 2-factor solution accounts for 36% of the variance. A 3-factor solution accounts for 50% of the variance, so I decided to conduct analysis using a 3-factor structure. I labeled the factors wildlife benefits, wildlife protection and wildlife use (the same labels offered by Fulton et al. 1996).

I placed respondents into low or high orientation categories based on the mean scale score for all respondents. Those who scored below the mean score for all respondents (1.61 for the benefits scale, 3.47 for the protection scale, and 2.07 for the

use scale) were placed in the high orientation subgroup (a low scale mean indicates higher agreement with items in the scale).

Measure of behavioral predisposition

A six-item bear sensitivity index (Peyton and Bull 2000) was used to measure tolerance for interactions with a black bear near one's home. The BSI defines intolerance as the point where someone would "ask/tell some authority to do something about the bear." The BSI index yielded a scale with high reliability (Crohnbach's alpha = 0.84) and allowed us to place a respondent in one of five categories of sensitivity based on the types of bear-human interactions each person would tolerate. For purposes of analysis in the case study, each respondent was assigned a sensitivity score of 0 to 7, with 0 meaning they would never contact authorities to intervene and 7 meaning they would call for an intervention if they experienced any of the interaction scenarios described. For analysis purposes, we used sensitivity score as a proxy for behavioral predisposition.

Regression analysis techniques

I used stepwise logistic regression (SPSS, Inc. 2004) to explore relationships between acceptability of bear-related hazards (dependent variable) and personal attributes, bear-related problem experiences, and exposure to mass media stories on bears or other wildlife. I used chi square tests and Pearson correlation coefficients to identify bivariate correlations between variables. With the exception of value orientation scores, all variables in the regression analysis were treated as categorical.

I expected to find that demographic variables, personal experiences, and value orientation would be predictive variables in models. The question I explored was whether media use variables are predictive, especially when used in a combined model with personal characteristics and experiences. To explore that question, I developed a

set of 3 regression models for the dependent variable. I first created a media-only model (model 1), which included just 2 variables (i.e., hours of television viewing per day and readership of wildlife-related newspaper articles). Next, I created a model that combined media use variables with variables on personal characteristics and personal experiences (model 2). Finally, I created a model that included main effects from the combined model and interaction effects among predictive variables in the combined model (model 3). The best models for each dependent are reported in chapter 5.

Structural equation modeling

Siemer et al. (in review) used a structural equation modeling (SEM) approach to test a conceptual model of factors affecting concern about health and safety threats posed by black bears and predisposition to request agency field response to address a human-bear conflict. Data from a 2002 mail survey conducted in New York State were used for this analysis. The survey instrument for the 2002 mail survey was designed to include measures of key variables in the social amplification of risk framework (SARF). A structural equation model was constructed using data from that survey. Relationships between independent and dependent variables were tested with structural equation modeling (SEM) software Lisrel 8.0, using a latent composite variable structural modeling technique. Siemer et al. (in review) used multiple goodness-of-fit criterion to test the fit of an a priori conceptual model to the data, including the χ^2 goodness-of-fit statistic, root means square error of approximation (RMSEA); the comparative fit index (CFI); and χ^2/df.

Exogenous variables in the model included: age, gender, education level, hunting, seeing bears, and negative experience with bears. Antecedent endogenous variables in the model included: wildlife value orientation scales (i.e., wildlife use orientation, wildlife benefits orientation, wildlife protection orientation), television

viewing, and print media exposure. Consequent endogenous variables included concern about bear-related human safety threats and bear sensitivity (measured using the bear sensitivity index developed by Peyton et al. (2000) and revised for use in New York (Siemer and Decker 2003). Sensitivity to human-bear interactions was measured using a set of seven item bear sensitivity index (BSI). For the purposes of modeling, responses to items in the BSI scale provide a measure of behavioral predisposition to contact authorities for field intervention during a human-bear interaction. The BSI was originally developed as a measure of wildlife problem tolerance or social carrying capacity (Peyton et al. 2000).

Evaluating outcomes associated with the group-model-building (GMB) intervention

In 2004, I began working with the action research team to support system conceptualization, model formulation, and management response to an increase in negative human-black bear interactions in residential areas of New York State. The modeling project had two research objectives: improving understanding of 1) why complaints about residential problems with black bears were increasing in New York; and 2) how managers might best intervene to control those problems. Project participants identified four desired project outcomes: 1) understanding of the system generating impacts; 2) consensus about the problem definition; 3) commitment to management actions; and 4) simulations for use in issue education. Understanding, consensus, commitment, and simulations are products that the project facilitators led the participants to expect, based on their understanding of GMB literature.

The team regarded this work as a pilot project and a learning experience. In addition to achieving the research objectives stated above, we agreed to utilize the experience to pilot test group model building as part of an AIM process, and as a tool to support decision recommendations by NYSDEC management teams. It was

understood that additional agency investments in quantitative group modeling would be predicated on the utility this pilot project had to agency staff and senior leadership.

Research questions

With respect to bear management actions explored during the GMB intervention, my evaluation questioned whether the model-building experience led to change in: 1) behavioral beliefs or control beliefs; 2) change in attitudes or subjective norms; or 3) change in team members' intentions to implement or actual implementation of management actions. I also critiqued the experience with regard to whether it contributed to learning and decision making within the project team. The evaluation was intended to help practicing wildlife managers assess how and under what circumstances they might use system dynamics models to enhance internal and external group deliberation about wildlife management policy.

Theoretical framework

Rouwette (2003) argues that skillfully facilitated group model building offers a mechanism by which project participants might persuade one another to change beliefs, evaluations, intentions, and behavior. Rouwette (2003) points out that GMB projects are only indicated (and only operate as a mechanism for persuasive communication) if applied in the context of an organization which is highly motivated to process information. Motivation is created, he argues, when an organization is facing decisions about a wicked problem (Rittel and Webber 1973) (i.e., a problem with a high level of complexity and uncertainty). He characterizes mutual persuasion in a GMB project as a process of mental model refinement. He also makes a compelling case for using the theory of planned behavior (Ajzen 1991) to operationalize the concepts of mental model refinement, commitment to a course of action, and system changes that represent the desired outcomes of most GMB projects (Figure 3.2).

Analysis approach

I used a mix of qualitative and quantitative techniques to evaluate the GMB project. I began by operationalizing Rouwette's (2003) theoretical framework to develop a logic model to guide implementation and evaluation of the bear management GMB project as a mechanism for persuasive communication (Figure 3.3). Program logic models (Funnell 1997, Frechtling 2007) have long been used by extension professionals and policy analysts to describe and evaluate public sector education programs. The GMB project logic model makes explicit the ways in which I expected context and mechanism to create conditions for mental model refinements by the project team. The logic model represented in Figure 3.3 helps guide objective critique about why the project succeeded or failed. Typical questions the researcher might ask include:

- did the program design reflect all key elements of the conceptual framework?
- was the program implemented as designed (or did external factors lead to significant deviations in program implementation)?
- were there flaws in the key assumptions underlying the program (if so, was it realistic to expect the program as implemented to achieve all of its stated goals)?
- was the evaluation adequate to assess belief change?

I used simple observations throughout the modeling process to obtain evaluative feedback. In addition to feedback obtained during modeling workshops, I met twice with the project team after the project to solicit verbal evaluations and to record group conclusions about the experience.

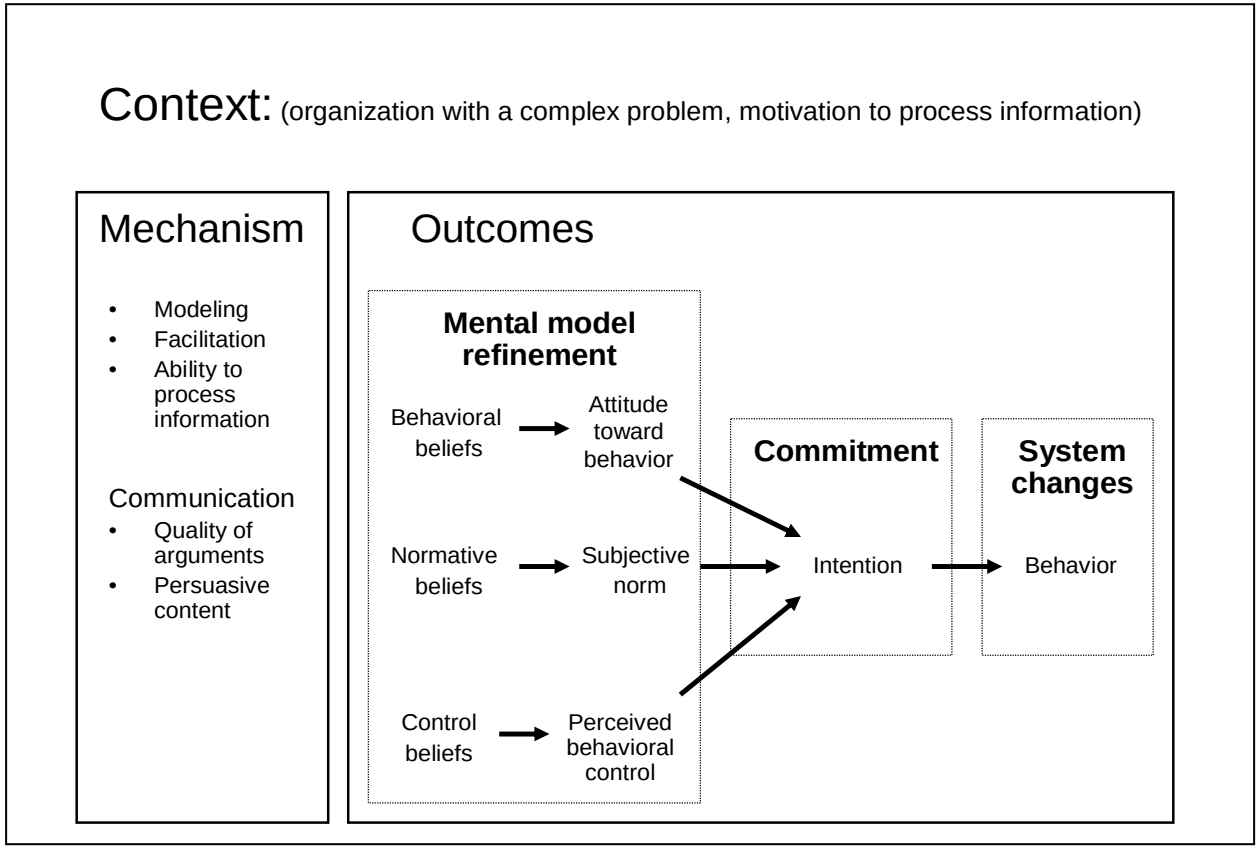


Figure 3.2. Rouwette's (2003:116) conceptualization of the context, mechanism and outcomes of group model building, incorporating the theory of planned behavior as an operationalization of mental model refinement, commitment to a course of action, and actual changes in the organizational system sponsoring a group model building project (source: Rouwette, E. 2003. Group model building as mutual persuasion. Nijmegen, The Netherlands: Wolf Legal Publishers).

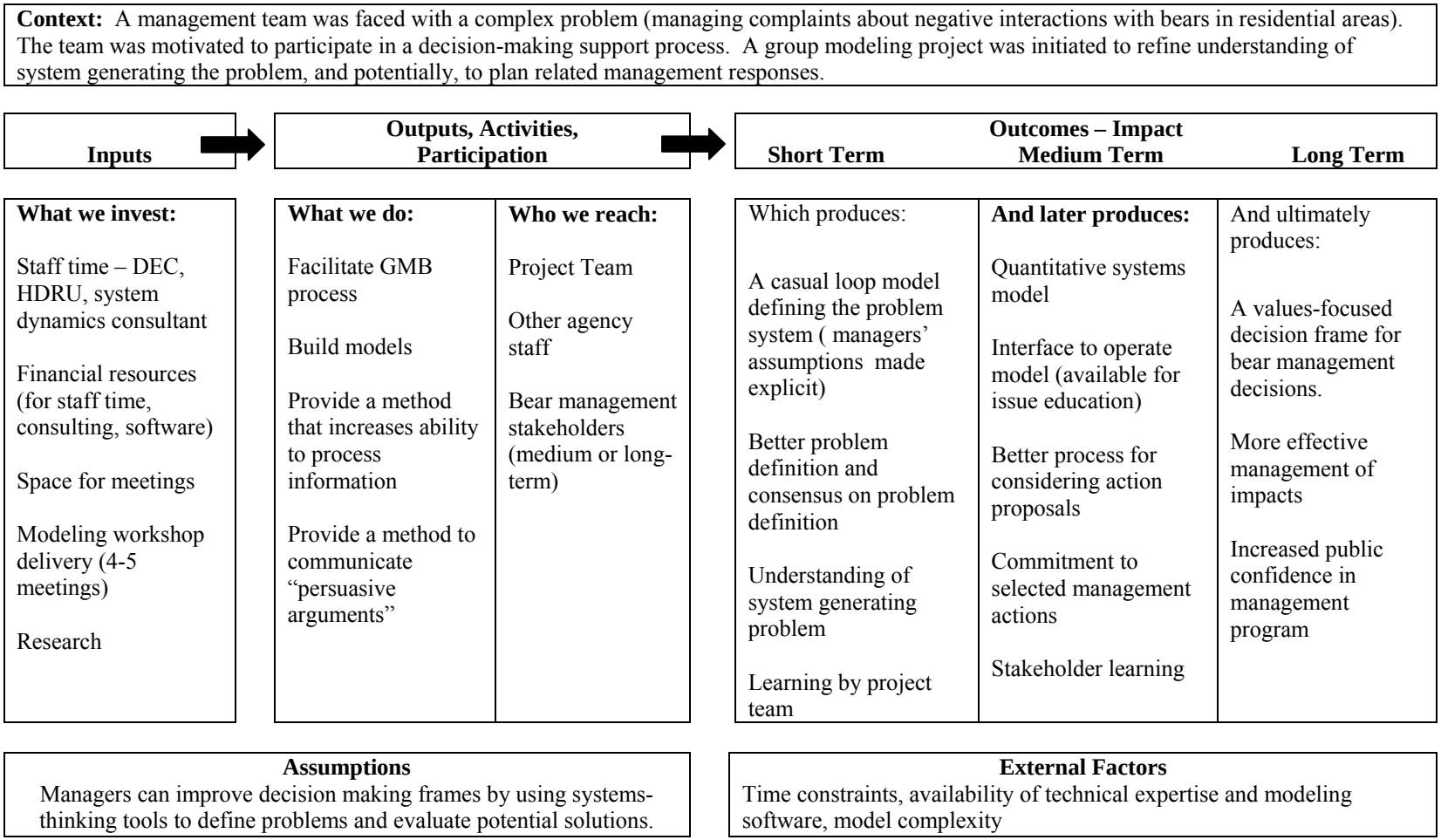


Figure 3.3. Logic model for group model building intervention to support black bear management in New York State.

Pre- and post-project questionnaires

I used a one-group pretest-posttest design to evaluate change in participants' beliefs, attitudes, and behavioral intentions after participation in a GMB intervention. Participants completed the pre-modeling assessment in January 2005 and the post-modeling assessment in December 2005. I employed Rouwette's (2003) theoretically-grounded framework for GMB evaluation as the basis for questionnaire design Appendix G-H). The pre- and post-modeling assessment instruments included items to assess elements within the theory of planned behavior, including beliefs, attitudes, subjective norms, and intentions (Figure 3.4). Questions focused on the three management actions which participants critiqued as means to reduce negative human-bear interactions and complaints about those interactions in residential areas. The management actions were: 1) increasing hunting opportunity; 2) providing problem prevention education; and 3) increasing staff capacity to respond to severe problems with bears. All items included a five-point response format. I used no statistical tests to measure pre-post differences because I had a census of all staff who participated in the entire modeling project.

Behavioral beliefs and outcome evaluations. I developed items to assess whether participants expected stakeholder interactions with bears, concerns about bears, intolerance of bears, and complaints about problems with bears to increase or decrease over the next five years. I then asked participants how likely they believed each of those changes were to occur, and how important it would be for their agency if those outcomes occurred. To assess outcome evaluations, I asked participants if they believed increase in interactions with bears, concern about bears, intolerance of bears, and complaints about bears over the next five years would be good or bad.

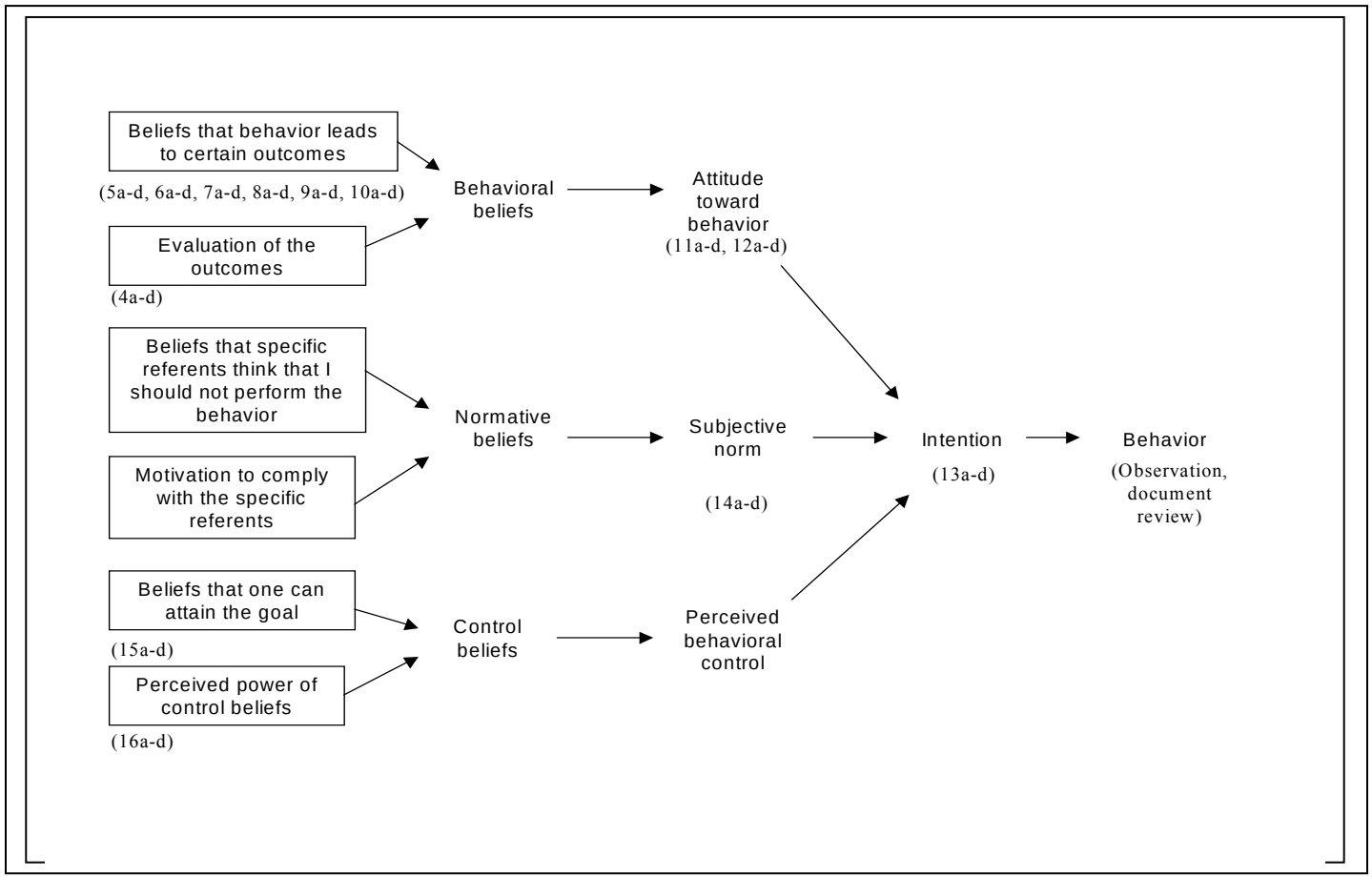


Figure 3.4. Elements of the theory of planned behavior, with pre- and post-modeling questionnaire items measuring each element shown in parentheses.

I developed two sets of items to assess participants' attitudes toward taking actions to increase hunting opportunity, prevention education, or staff capacity. The items assessed whether participants expected the actions to be harmful or beneficial, and whether participants held a favorable or unfavorable opinion toward using those management actions to reduce complaints about problems with bears.

Normative beliefs. To assess subjective norms, I asked if participants thought most staff in their agency would agree or disagree with taking particular management actions to reduce complaints about problems with bears.

Control beliefs. To assess control beliefs, I asked participants whether they thought it would be easy or difficult to implement particular management actions, and whether there were few or many impediments to implementing those actions. To assess perceived behavioral control, I asked participants how much control they thought their agency could exert over frequency of negative human-bear interactions, number of annual complaints about bear-related problems, and concern about bear-related problems.

Behavioral intention, agency behavior. To assess behavioral intentions, I asked respondents whether they would support or oppose use of particular management actions to reduce complaints about problems with bears. I assessed agency behavior after the modeling project through ongoing personal communication with project participants.

Semi-structured practitioner interviews

Interview purpose

AIM represents an innovation in the management cycle because it: 1) focuses on impacts; 2) utilizes an informed transactional approach to stakeholder engagement; and 3) emphasizes systems thinking/modeling. I conducted semi-structured personal interviews with wildlife agency staff to understand adoption of this tri-part innovation

as a function of staff perceptions of the traits of the innovation and the traits of their organization (Appendix I).

The interview data serve two purposes. First, they provide convergent information about outcomes associated with AIM implementation (i.e., the interviews provide data with which to triangulate findings from other data collection techniques). Second and perhaps more importantly), the interview data provide insights about why things were implemented as they were and why DEC staff think their organization will or will not continue using various aspects of the innovation.

I focused each interview on a subset of steps related to innovation in the management process, namely staff perceptions regarding AIM as an approach to: situation analysis, objective setting, systems thinking/models, and identification and selection of alternatives. A substantial portion of each interview focused on situation analysis, which in this case unfolded in multiple steps to identify impacts, clarify impacts, and utilize survey data and a mass media content analysis to improve understanding of how stakeholders form impact perceptions.

Interview content and implementation

I developed an interview guide to conducted semi-structured interviews with 11 of 12 agency personnel who were members of the Black Bear Management Plan Team during most or all of the case timeframe (2001-2008) (one retired member of the team was not reached for an interview). Most interviews were conducted by telephone and lasted an average of 61 minutes (interview length ranged from 44 to 85 minutes).

Analysis

Each interview was tape-recorded and transcribed. I coded interview content (quotes) according to themes that emerged in several categories: traits of AIM as an innovation (e.g., trialability, relative advantage); traits of DEC that influence innovation adoption or implementation (e.g., innovativeness, reward systems; resource limitations, etc.); process outcomes (e.g., learning).

Participant observations

Observations included my own thoughts, notes, and ideas generated over the life of the project. My observations cut across all facets of implementation and outcomes research and addressed all study questions. My observations served as a means to triangulate findings from other methods of data collection.

I made observations during meetings of the Black Bear Management Plan Team, which were held quarterly and at other times on an as-needed basis. I met with the team multiple times each year (approximately 35 group meetings between 2001 and 2008 and corresponded with individual team members regularly. I made participant observations while helping the team to develop and implement the SIG process and GMB process. Meetings and correspondence, and thus my opportunities for observation, were greatest during the group-model-building project.

Document analysis

Document analysis included review of DEC documents and internal correspondence with DEC, meeting minutes, and published research in New York. I reviewed documents in order to facilitate description of AIM adoption and implementation, and to compare and contrast AIM implementation to the process wildlife agency had used previously to move through cycles of black bear management.

CHAPTER FOUR

IDENTIFYING, CLARIFYING, AND LINKING IMPACTS TO FUNDAMENTAL OBJECTIVES

Introduction

One of the conceptual innovations represented by AIM is its focus on stakeholder-defined impacts as the basis for fundamental objectives of wildlife management. The purpose of this chapter is to present case research observations and insights related to impact identification, impact clarification, and linking impacts to fundamental objectives for a black bear management program. I drew on observations, participant observations, archival document analysis, survey data and AIM practitioner interviews[2] to conduct this aspect of the case study (detailed description of methods appears in chapter 3). Data collection focused on two embedded units of analysis: wildlife managers and wildlife management stakeholders.

Wildlife agencies can only expect to obtain the anticipated benefits of AIM if they correctly operationalize and implement the conceptual principles of AIM. Those who would evaluate AIM in practice are obligated to document a program's operationalization and implementation before they can critique the underlying assumptions of AIM adequately and assess why progress toward expected benefits was or was not achieved. Thus, I begin this chapter by describing how impacts management was adopted and implemented. Part I of the chapter documents how leaders within the case study wildlife agency came to adopt the idea of impacts management, and how a staff team within that agency designed a framework for program planning based on the concept of AIM and went on to implement the tenets of impact management in their practice. I reflect on the factors and conditions that

[2] Supporting quotes provided in the body of the text are illustrative rather than comprehensive. Full interview transcripts and analysis files are available and may be obtained by contacting the author.

influenced adoption and implementation of impacts management. I also present documentary evidence to make the claim that implementation of AIM principles reflects an incremental change in that agency's approach to stakeholder engagement (i.e., a move away from an authoritative approach and toward an informed transactional approach).

Part I focuses on activities related to loops 1a and 1b in Figure 2.3 (a schematic characterization of the informed transactional approach to stakeholder engagement and decision framing). Impact identification and clarification are a key component of situational analysis, an early step in the AIM process (Figure 2.1). As this case demonstrates, however, situational analysis within an AIM approach can be extensive and may be revisited throughout the course of a full cycle of AIM implementation.

In Part II, I present findings related to outcomes of AIM implementation (e.g., deliberation, learning, value-focused thinking) that may influence agency performance over a long time horizon. I end the chapter with a synthesis of conclusions related to case research questions 1-3 as those questions relate to the topic of impacts management.

Findings and Discussion Part I: Adoption and Implementation

Part I of this chapter addresses my first and second case research questions with respect to impacts (i.e., Part I asks, how were the principles of AIM implemented in this case, and why were some portions implemented and others not?).

Document review and reconstruction of key research and outreach activities during this case provides evidence that, with regard to impacts: (1) operationalization showed high fidelity to the conceptual foundations of AIM; and (2) an AIM approach was implemented as designed and planned. Implementation was generally in keeping with program logic models with regard to identification and clarification of impacts, and was present but weaker with regard to linking impacts to fundamental objectives.

The following subsections address case research question one and two by providing an overview of initiation, adoption, and implementation of AIM for black bear management in New York, with commentary on catalysts and impediments to AIM adoption suggested by case research observations and practitioner interviews.

The initiation stage and adoption decision

The initiation stage of innovation adoption includes awareness of an innovation, consideration of the innovation, and finally, intention to use the innovation. In this case, the initiation stage occurred over a two-year period (2000-2002).

Three leaders in the DEC Bureau of Wildlife (BOW) were first exposed to AIM concepts in 2000, when HDRU personnel began collaborating with those leaders on a writing project that came to be known as the "essence paper." Through a series of deliberations associated with writing and publishing that manuscript (Riley et al. 2002), the authors (who included two agency leaders) developed a shared belief that managing to achieve stakeholder-defined impacts is the essence of wildlife management. Riley et al. (2002) first presented those ideas to an audience of professional peers at the 63rd Midwest Fish and Wildlife Conference (Des Moines Iowa, December 2001).

Extensive HDRU-DEC interactions between 2000 and 2001 (i.e., multiple workshops, meetings, correspondence, collaborative writing) served as an initiation period for BOW leaders to become aware of and consider impacts management in principle. During the same time period black bear management was emerging as a priority for DEC. BOW had responded by creating a new working group –the Black Bear Plan Team (Bear Team)—to develop a comprehensive statewide management plan to address public concerns about problem interactions with bears. DEC approached HDRU in 2001, requesting HD research support to inform development of

a new statewide bear management plan. HDRU proposed that the work be structured around the concepts of AIM. That proposal was quickly accepted by BOW leadership, who had been exposed to AIM concepts on multiple occasions over the preceding year. HD staff designed the new HD research activity (titled, "Input for Black Bear Management Plan") to gain information for short-term and long-term decisions identified by the Bear Team. In the short term, the Bear Team requested a study that would fulfill DEC's immediate information needs (e.g., characterize stakeholder experiences with bears, attitudes towards bears, and views about hunting and other management actions). Over a longer time frame, the Bear Team requested technical support and research to employ an adaptive impact management.

DEC's decision to structure the new HD research project around AIM principles was a formal adoption decision that initiated a period of situation analysis focused on impact identification and clarification. Use of impacts terminology (another indicator that staff were adopting the idea of impacts management) began to appear in DEC communications in 2002 (Table 4.1). It would be 2003, however, before the Bear Team formalized their internal adoption decision as an externally-publicized framework for bear management decisions based on impacts (DEC 2003a).

Riley et al. (2003) developed a second paper as a spin-off of developing the essence paper, which came to be known as "the AIM paper," that lays out the elements of AIM as an innovation in the typical planning cycle. Like the essence paper, the AIM manuscript went through many draft revisions and was not submitted for publication consideration until 2002, approximately a year after DEC had contracted with HDRU to do research in support of a new black bear management plan. DEC was beginning to put AIM principles into practice by 2002 and those experiences informed the final drafts of the AIM paper (Riley et al. 2003). Adoption and initiation of an AIM approach by DEC is evidenced by the fact that Riley et al.

Table 4.1. Reference to impacts in DEC communications.

"Questions from the bear team" memo: An internal memo from Siemer to the Bear Team (6/26/2002) reiterates the charge to the team from Gordon Batcheller. The charge instructs that the plan contain at a minimum five elements. One of those elements was "Organizational effectiveness on how best to deliver what people want taking into consideration both use and nuisance objectives and **impacts**." The inclusion of the word impacts reflects adoption of the idea that the Bear Team would take an impacts management approach as they fulfilled their charge to create a statewide bear management plan.
Resurvey of people's opinions about bears" memo: Memo from Lou Berchielli to the Bear Team (9/5/02) encourages the Team to fund a resurvey to assess whether a bear-caused human fatality in New York influences public concern or risk perceptions related to bears. Berchielli reminds the team of what was included in the mail survey, and mentions that, "surveyed people's : past experience with bears; views; attitudes; opinions; beliefs; knowledge about bear populations and changes desired for those populations; support for regulated hunting, expanding each hunting area and urban and nuisance preventive interventions; ranking of eight positive and thirteen negative **impacts**; responses to seven bear/people incidents and the use of TV and newspaper medias." The same memo makes reference to trying to make the bear plan adaptive: "This survey was completed just before the incident in the Catskills and will be very valuable in the initial drafting of goals and objectives **for our Black Bear Adaptive Impact Management Plan**. We now have a tremendous opportunity to determine any changes in the measures of opinion and perception mentioned above by doing another survey. I've been asked by bear biologists from Manitoba, Maine, Conn, Mass, NH, Va, Pa and New Jersey if we are going to resurvey. Human dimensions researchers from additional states are interested as well. I think a resurvey will be especially valuable in demonstrating how to make **and keep our management plan Adaptive**. The original survey measured people's opinions on expanding bear ranges. Our management plan will have to accommodate any changes in those opinions."

Table 4.1. Continued.

Memo from Dick Henry (28 July, 2003): In July of 2003, the Bear Team received a decision from the Bureau Management Team (a supervisory group higher in the chain of authority in the Bureau of Wildlife) to accept the framework and implementation of the SIG process. The quote below documents that the team was making decisions about scale based on anticipated impacts. They held two separate processes in the Catskills because they believed their was a difference in impacts in those two locales. **"**Considering **the impacts** of bear immigration from New Jersey, and our agency's support for NJ's proposed management actions, it was felt that it would be desirable to utilize two SIGs for the Catskills, along the lines of the traditional northern Catskill/ southern Catskill bear ranges."
Natural History document (August, 2003): "First published in the spring of 2000, New York's SOPM contains procedures and other recommendations for addressing over 50 situations in which humans might become involved with bears or their **impacts** (Henry et al. 2000)." (Natural History document, page 16)
Planning framework: makes extensive reference to impacts and impact management.
DEC website (2003): publicizes SIG process implementations and summarizes work of stakeholder groups to define identify impacts and make linkages between impacts and potential management actions to address impacts.

Table 4.1. Continued.

DEC bear harvest press release (April 7, 2004): Every year DEC puts out a press release with information on bear harvest by region and county. The 2004 release included text to build awareness of the SIG process and the planning framework. We do not know how many newspapers included that part of the press release, but it shows that DEC had adopted an impacts management approach and had provided a way for anyone in the state to read the plan and learn about the SIG process.

"During the fall and winter of 2003-04 DEC sponsored its first black bear **stakeholder input group meetings** in the Catskill region and western New York. Stakeholder groups, including home owners, businesses, campground staff, hunters, farmers, hikers and backpackers, were invited to participate in a series of facilitated meetings to assist in the formulation, direction and priority of future bear management initiatives in these regions. Some of the recommendations of these groups included: increased hunting in the form of expanded bear hunting areas and/or season changes and a need for increased public education about preventing negative bear interactions by improperly storing food and garbage. More detailed summaries of the stakeholder meetings will be available on our website later this spring. DEC's bear management plan is available on DEC's website at http:// www.dec.state.ny.us/website/dfwmr/wildlife/wildgame/bearplan.html

Human and bear conflicts have been on the rise across New York State. The higher harvest numbers achieved in 2003 and the future implementation of some of the Stakeholder recommendations may help to slow down this escalation and curb the frequency of bear problems in the future and thus achieve a better balance between bear populations and people."

Table 4.1. Continued.

Living with New York black bears: This 60-minute educational video has a 15 minute segment on New York black bears. That segment contains about 2 minutes (starting at the 12 minute 50 second mark) referring to the new planning framework, SIG groups, and focusing on impact management in New York. [Narrator's voice] "In 2003, the DEC developed a new framework for managing black bears which relies on input from a variety of stakeholders. [Ed Reed, DEC Region 5] "We are running stakeholder information groups [SIGs] around the state, which is a group of people from all walks of life. We get homeowners, we get hunters, government officials, bee keepers. Anybody who has an interest in bear management is part of these groups. They don't dictate management, but they do suggest things to us that could be changed. And we listen to them quite a bit. We've been doing this in deer management for about 15 years now, and we've found that it's a very helpful process." [Return to narrator's voice] "These stakeholders prioritize local **impacts** and make management suggestions to the DEC. In managing New York bears, the DEC considers the possible positive and negative **impacts** as they relate to ecological systems, economic effects, health and safety of citizens, and social impacts. Common suggestions from past stakeholder input groups include recommendations for the DEC to increase educational efforts, to minimize bear problems, and reducing local populations by increasing hunter opportunity."

(2003) describe the early stages of AIM for black bear management in New York as an example of AIM in practice.

Further evidence that members of the Bear Team adopted AIM in practice (i.e., evidence that adoption went deeper than the adoption decision made by administrators) appears in passages like the following, taken from a practitioner interview.

> Well, the bear team coming back to create more SIG meetings in these different areas, shows that it was valuable to the team members and, you know, they perceived that as the way to go. I was glad to see that, because that's, you know, actions that they themselves generated. You know, it wasn't [a regional manager's

> name] or I forcing them to do that. …that was real nice to see, that the team members utilized that process once it was developed. I'm not really an official team member [now] so I don't go on out and set up a SIG meeting, but I am encouraged when I see the team members do that now, without being required to or, you know, led by hand to take those actions. Certainly we had plenty of good leadership and help, you know, Cornell and whatnot on establishing them initially, but their willingness to continue that process and use that process is very good in my opinion, plus it reflects well back on the whole process.

Catalysts to an adoption decision

The adoption decision in this case was catalyzed by at least a year of work with a few leaders in the agency. More than a year of additional collaborations transpired before the members of the Bear Team completed the bear management framework document (NYSDEC 2003b), a publication documenting that both regional and central office personnel had made a public decision to use (adopt) AIM principles as a framework for making decisions and proposing management actions. Extensive collaboration between HDRU and DEC personnel were necessary to catalyze first and second-level adoption decisions.

Adoption implementation

Implementation of a full AIM cycle (from situational analysis through monitoring action outcomes) took place as a series of linked activities between 2001 and 2008 (Table 4.2). Case research observations presented in this section provide evidence that design of the AIM pilot project was based on the conceptual elements of AIM, and the pilot project was for the most part implemented as planned (i.e., implementation fidelity was relatively high).

Operationalizing the AIM concepts

DEC's Bear Team was charged with responsibility to develop a statewide comprehensive bear management plan. Working collaboratively with HDRU staff, the

Table 4.2. A summary of significant research and outreach tasks related to impact identification, clarification, and communication between 2000 and 2008.

Time period	Project milestones, influences on AIM adoption
Winter 2000	HDRU awarded funding for a HATCH grant proposal titled "Development of adaptive impact management: a novel approach to wildlife management." Matched with other funding (CALS Agric. Experiment Station), this allows HDRU staff to initiate work on concept papers and begin exploring the impacts concept in deer management studies. (support for AIM development)
2000-2002	HDRU and DEC staff collaborate on writing projects to articulate AIM concepts (leads to multiple meetings, correspondence, and collaborative writing with members of DEC Bear Team or Bureau Management Team) (served as initiation stage of adoption)
Spring 2001	DEC leadership contracted with HDRU to begin a new activity titled "Input for black bear management plan." That research activity was established to support HD information needs related to DEC's work to create a comprehensive, statewide management plan for black bears in New York. (support for AIM implementation)
Summer 2001	Initiated work with managers to define impacts. (situation analysis: impact identification)
Fall 2001	Completed 3 nominal group processes (yielded stakeholder-defined impacts). (situation analysis: impact identification)
Winter 2002	Finalized instrument, began implementation of statewide mail survey.
Spring 2002	Completed 2002 statewide mail survey.
Summer 2002	Coded survey data, began data analysis; completed post-fatality telephone survey.
Fall 2002	Analyzed mail and telephone survey data; consulted on development of management planning framework.

Table 4.2 continued.

Time period	Project milestones
Fall 2003	Bear management framework document published.
Winter 2003	Oral presentation of study results; consulted on development of management planning framework.
Spring 2003	Oral presentation of study results; consulted on development of management planning framework.
Summer 2003	Developed SIG process framework.
Fall 2003	Summary report from mail survey; initiated 3 SIG processes.
Winter 2004	Finished 3 SIG processes.
Spring 2004	SIG process final report completed.
Summer 2004	Presented additional survey data analysis.
Spring 2005	Completed Region 7 SIG process.
Spring 2006	Completed East of Hudson SIG process.
Summer 2007	Consulted with Bear Team on revision of management framework document.
Fall 2007	Bear management issue education meetings.
Spring 2008	Bear management issue education meetings.
Spring 2008	Region 3 SIG process (Dutchess, Putnam counties) planned, but not implemented due to staff time constraints.

Bear Team developed a new framework for black bear management planning in New York State in 2002. DEC's management framework document was finalized, approved, and released to the public in 2003 (NYSDEC 2003a). The framework established a cyclical process for adapting New York's management program to changing social and environmental conditions. Key elements of the planning framework were captured in a schematic (Figure 4.1) that also documents the team's implementation strategy for stakeholder engagement in bear management. The framework document was directly informed by Riley et al. (2002, 2003). As a result, stakeholder engagement, focus on impacts, manager-stakeholder deliberation, and adaptive management were incorporated as featured elements of the planning framework.

Figure 4.1. depicts the basic components of an iterative process of stakeholder engagement in bear management decisions. All of the planned activities depicted in Figure 4.1 were completed in some fashion between 2001 and 2008, and some of the depicted actions were completed more than once over time and geographic location between 2001 and 2008. Much of what is depicted in Figure 4.1 falls into the category of AIM situational analysis designed to identify and clarify stakeholder-defined impacts. In the following sections, I summarize the series of engagement exercises and feedback activities the Bear Team conducted between 2001 and 2003 to identify impacts and fundamental objectives linked to impacts.

Identifying and clarifying impacts through situation analysis

Table 4.3 identifies the series of facilitated processes that the Bear Team used to gather and synthesize information from stakeholders. The first column of Table 4.3 identifies synthesis activities; the second column identifies procedures used to obtain input from bear management stakeholders.

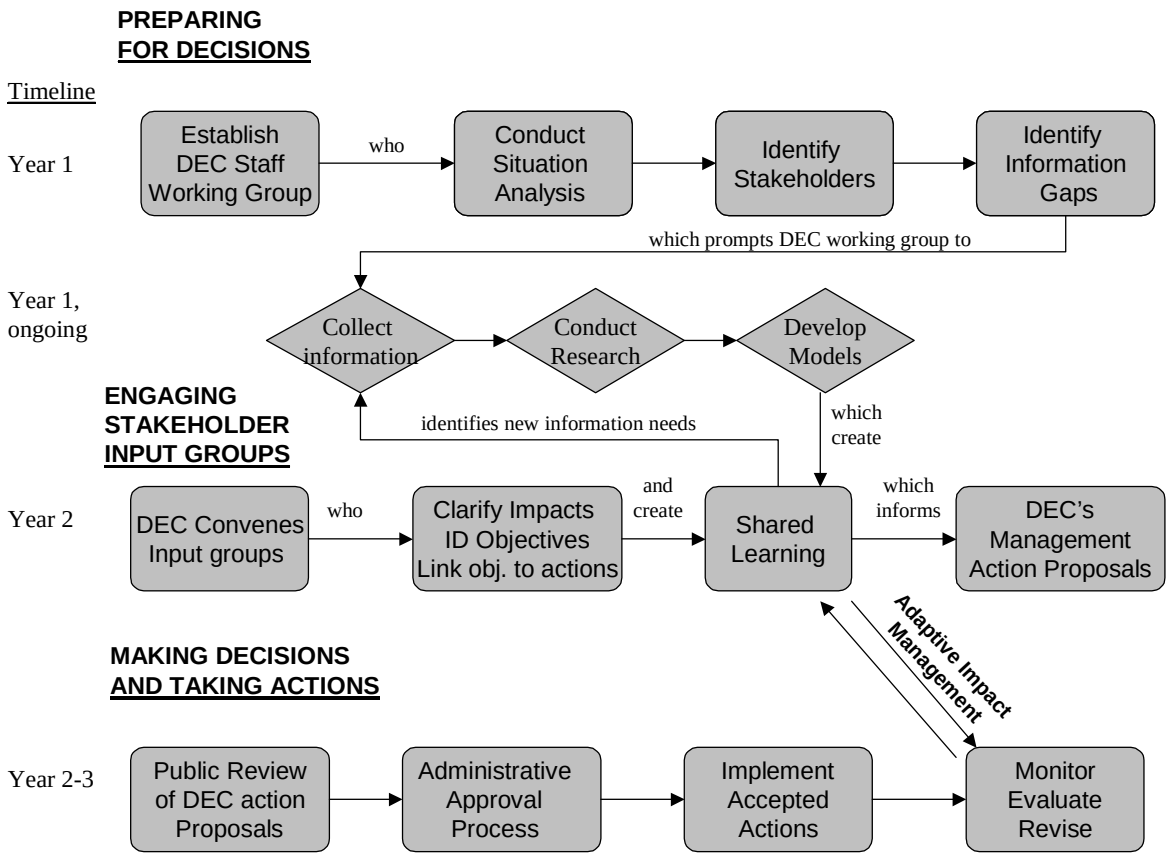


Figure 4.1. An outline of the cyclical process DEC staff developed as a framework to revise the black bear management program in New York (Source: NYSDEC 2003a).

Table 4.3. A summary of public engagement exercises and input synthesis processes utilized by NYSDEC to identify and characterize black-bear related impacts in New York State, 2001-2003.

Public engagement exercises	Synthesis processes used by engagement organizer
Input for bear hunting and dog training regulation changes (1992-1994)	
	Facilitated process to synthesize past public input and managers' experience as preliminary impacts statements (2001)
Nominal group sessions held in 3 regions to generate lists of effects that might be impacts (2001)	
	Facilitated process used to synthesize input from nominal group sessions as guidance for preparation of a mail survey instrument (2002)
Mail survey implemented to collect representative input on impacts by region (2002)	
	Facilitated process used to synthesize new input on impacts (2003)
Stakeholder input groups (SIGS) convened to provide detailed insights at a local level, and begin discussing ends-means connections (2003)	

Rowe and Frewer (2005) offer a typology of public engagement mechanisms based on information flow between the sponsor of engagement exercises and the participants in those exercises. Most of the exercises listed in Table 4.3 represent consultative forms of public engagement (Rowe and Frewer 2005), where stakeholders convey information to policy makers through processes initiated by the policy-making body (DEC, in this case). The final exercise listed in Table 4.3 (i.e., the stakeholder input group [SIG] process) represents a participatory form of engagement, with two-way information exchange between stakeholders and a policy-making agency. In participatory forms of engagement, structural elements such as dialogue and negotiation are expected to create opportunities for opinion change in stakeholders or members of the policy-making agency (Rowe and Frewer 2005:256). Because the SIG process was designed to encourage deliberation and focus on impacts, it provided opportunities to question both stakeholders' and manager's assumptions and mental models.

The overall effectiveness of a public engagement strategy depends in part on how well the mechanism elicits information from all members of a target audience. Sponsors of a public engagement effort should strive to follow the general principle that participation exercises involve a representative sample of stakeholders potentially affected by a policy decision (OECD 2001). Sponsors may need to utilize a variety of participation mechanisms to reach out to and receive information from a broad spectrum of bear management stakeholders. DEC's approach to public engagement in this case reflected an understanding of these needs. SIG processes were employed as part of a comprehensive engagement approach, not as a replacement for engagement mechanisms like public information campaigns, stakeholder surveys, or established regulatory review processes. Each of the public engagement mechanisms used by the team are summarized below.

Bear Team synthesis of past input. First, the Bear Team generated a preliminary set of impacts, based in part on insights from a series of public meetings conducted between 1992 and 1994 as a means to solicit input on proposed bear hunting and dog training regulation changes.

Nominal groups. As a next step, the Bear Team worked with human dimensions specialists, who designed and implemented a series of regional nominal group meetings to obtain input on the range of impacts recognized by stakeholders in 2001.

Statewide survey. Findings from the 2001 small group meetings informed design of a self-administered mail-back questionnaire. The questionnaire was used as the data collection instrument for a statewide survey implemented in spring, 2002. The stakeholder survey allowed researchers to describe better the effects that stakeholders recognized as impacts, and to quantify differences in stakeholder experiences and attitudes across regions (e.g., Catskills vs. Adirondacks), stakeholder groups (e.g., hunters vs. nonhunters) and value orientations (Fulton et al. 1996).

SIG process input. Input from the 2002 mail survey was supplemented with input from a stakeholder input group (SIG) process. HDRU and Cornell Cooperative Extension (CCE) personnel developed, implemented, and evaluated the SIG process (Schusler and Siemer 2004). HDRU, CCE, and DEC personnel applied the SIG process in three locales in 2003: the upper Catskill region, lower Catskill region, and western New York. The SIG process was designed to "… help DEC staff articulate area-specific management objectives (based on identified impacts) and related plans of action" (DEC 2003a:17). DEC and HDRU personnel served as technical advisors, answering questions about the biological and social dimensions of black bear management.

DEC defined stakeholder input groups as temporary, *ad hoc* entities. Each group had about a dozen members. CCE facilitators selected participants from

candidate lists they developed together with assistance from DEC personnel. Facilitators selected participants to reflect diverse stakes in and perspectives on black bear management (i.e., people experiencing different kinds of impacts), and to minimize over representation of any single interest.

Participants were asked to: review two background documents; seek input from others; contribute local experience and knowledge; participate as an individual (not as an official representative of a particular group); and keep an open mind. CCE, HDRU, and DEC personnel were expected to: facilitate meetings, provide subject matter expertise, respond to participants' questions and information needs, keep an open mind, and incorporate input as feasible into proposals for management actions.

Each input group was expected to: clarify bear-related impacts, identify priorities for impact management, and suggest actions to manage key impacts. The initial meeting was designed to develop a common information base among participants. During the first meeting, CCE, HDRU, and DEC personnel introduced the planning framework and SIG process, presented information on bear natural history, introduced the concept of impacts, and instructed participants to seek input from others in their community or stakeholder group.

In the second meeting, facilitators asked participants to review, clarify, and add to the list of bear-related impacts that the Bear Team had developed from prior stakeholder engagement activities. Participants were then asked to prioritize which impacts were most important in their region of the state. Each group was asked to select priority impacts on which to focus further discussion. In the third meeting, facilitators led discussion and ends-means linking exercises that helped participants articulate their interests and concerns as a set of fundamental objectives, enabling objectives, and management actions related to the impacts they had identified as priorities for management.

Adherence to SIG process logic model. HDRU personnel worked with DEC personnel to design a process logic model to guide SIG implementation (Figure 4.2). Participant observations and feedback from Bear Team members suggest that the inputs and activities listed in the logic model were satisfied. Staff time, financial resources, and guidance documents were all provided. Facilitation of the SIG process was delivered by HDRU, DEC, and CCE personnel. HDRU personnel provided DEC practitioners with guidance on SIG process implementation. DEC and HDRU personnel provided guidance to SIG participants, outlining what participants could expect during and after the process.

Objective setting (ends-means linking)

A series of activities ends-means linking exercises were employed in this case as an aid to objective setting. Members of the Bear Team went through an iterative process to develop fundamental objectives linked to impacts, and to conceptualize linkages between fundamental objectives, enabling objectives and management actions. That body of work, which synthesized managers' experience and stakeholder input, culminated in a set of eight ends-means matrices (Siemer and Decker 2006). Figure 4.3 provides one example of the ends-means matrices that were developed to articulate how the Bear Team designed fundamental objectives based on impacts, and then linked their fundamental objectives to enabling objectives and potential management actions. Ends-means diagrams like the one presented in Figure 4.3 synthesize biological and other dimensions of management via linkages to achieving a fundamental objective. The thought processes embodied in such diagrams represents agency progress toward the goal of integration mentioned in Riley et al. (2002, 2003).

Although practitioners made progress toward the ideal of integration in this case, the challenges they encountered raise concerns about the potential to instill ends-means thinking as a routine part of objective setting within wildlife agencies. Explicit efforts to link ends and means were instigated by the HD research team and would not

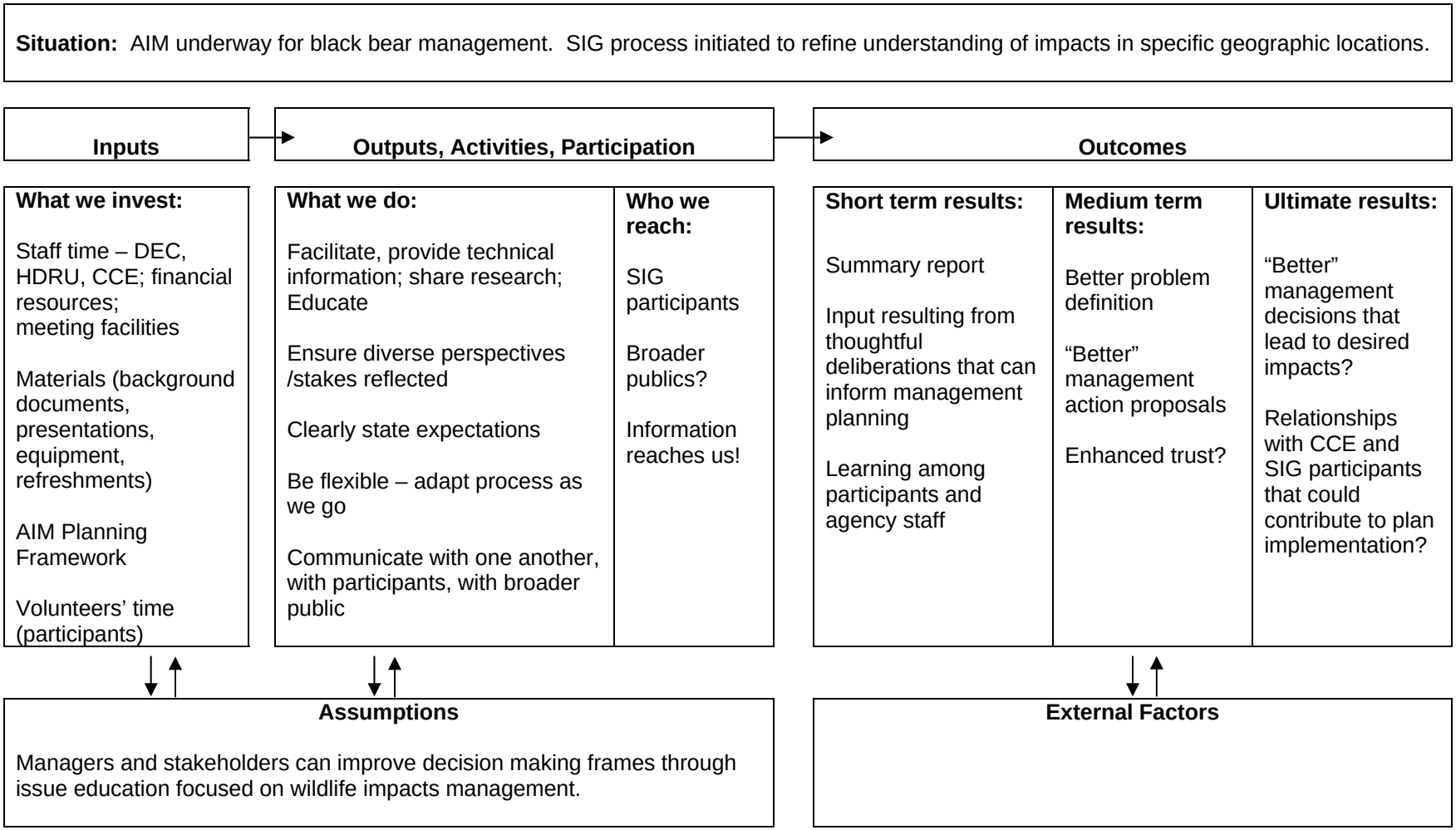


Figure 4.2. Logic model for stakeholder input group (SIG) process for AIM of Black Bear in New York State.

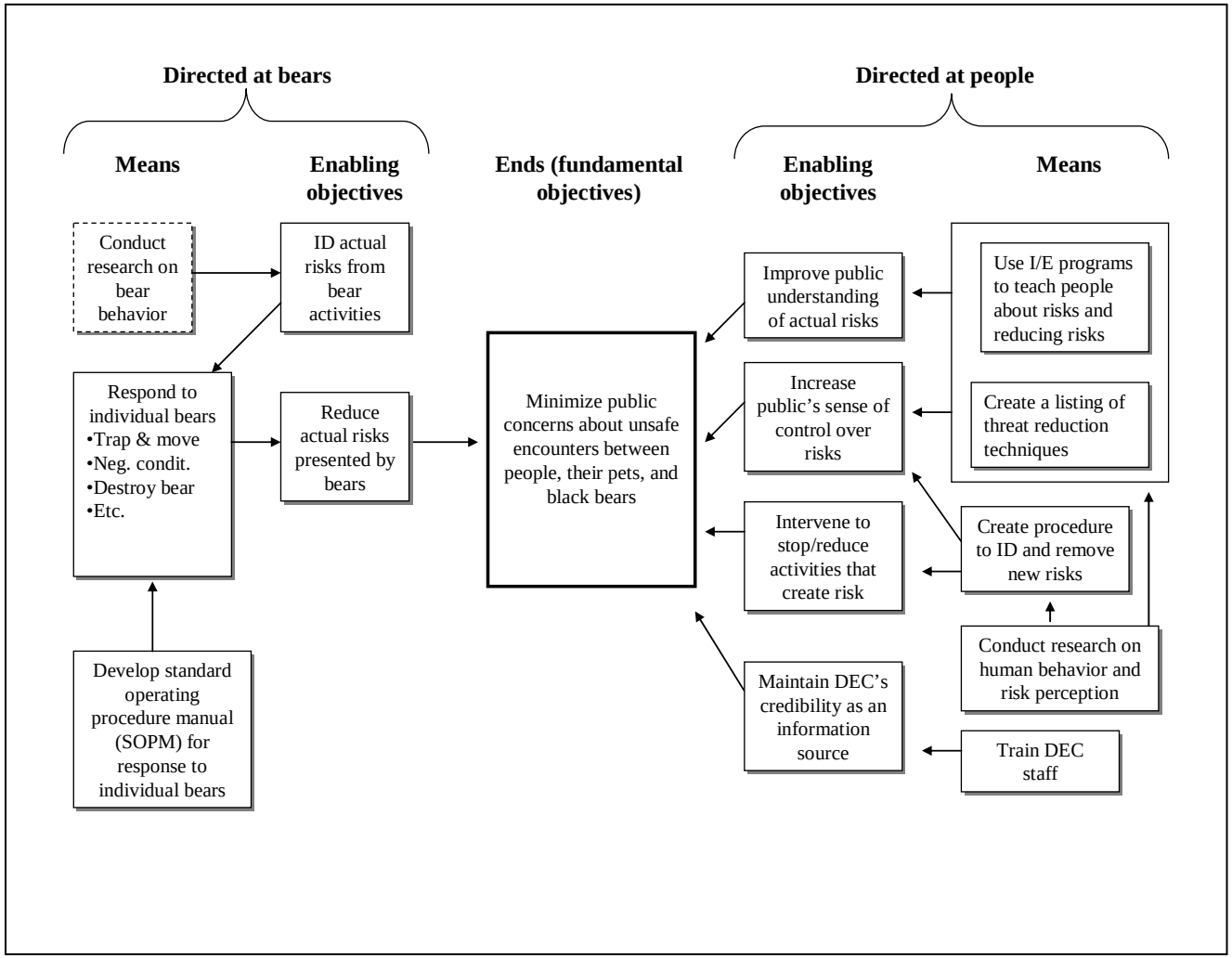


Figure 4.3. Ends-means matrix developed by DEC staff to represent how their bear management program might address a psychological impact (i.e., concern about unsafe human interaction with bears) associated with bears in New York York State (source: Siemer and Decker 2006).

have occurred without such intervention. Members of the Bear Team had difficulty grasping new terminology related to fundamental and enabling objectives, and many also were reluctant to engage in strategic planning activities. Thus, the team lacked both the capacity and self motivation to conduct ends-means linking exercises without intervention by a process facilitator. These findings suggest that ends-means thinking, like evaluation and monitoring, are unlikely to receive adequate attention in an AIM implementation unless management teams continue to receive outside technical support.

Catalysts to adoption implementation

I relied on participant observations and analysis of transcripts from practitioner interviews to identify catalysts and impediments to AIM implementation in this case. A review of innovation implementation literature prompted me to focus on three categories of attributes (i.e., attributes of impact management, the sponsor organization [organizational structure and culture], and the practitioners implementing AIM) as potential influences that facilitated or impeded implementation of an AIM approach.

AIM practitioners suggested a relatively short list of conditions, processes, and outcomes that catalyzed AIM implementation (Table 4.4). The most important catalysts were adequate resources for implementation, assistance from facilitators familiar with AIM principles, and visible success in addressing agency needs (Table 4.4).

Skilled facilitation. The finding that skilled facilitation is a catalyst to adoption of AIM is consistent with literature. Rowe and Frewer (2005:269) point out that presence/absence and quality of facilitation is an important structural aspect of public engagement mechanisms.

Table 4.4. Catalysts to adoption and continued implementation of impact management by the Bureau of Wildlife, NYSDEC.

Attributes of impact management

- Visible success of impact management: acceptance of regulatory proposals
- Visible success of impact management: faster acceptance of regulatory proposals
- Visible success of impact management: evidence that it helped staff support decision recommendations.
- Visible success of impact management: evidence that it helped staff defend decision recommendations.
- Plans in place to guide recurring activities associated with impact management.
- Presentations and publications describing impact management in practice.
- Streamlined involvement processes (so staff can do more implementation with additional groups).

Attributes of sponsor agency (organizational structure and culture)

- Provision of resources for skilled support to teams.
- Provision of support for training.
- Provision of staff to implement communication, outreach.
- Renewed (or new) agency commitment to feedback processes.

Attributes of AIM practitioners

- Staff agree in principle that public involvement in wildlife management decisions and programs is necessary and valuable.
- Staff believe that "on the job" training was key in giving them the skills they needed to successfully contribute to stakeholder engagement processes.
- Staff believe that having the support of personnel with expertise in process facilitation played a critical role in their project; they believe it was essential in helping them collect high quality stakeholder input.

> Active facilitation has been shown to increase relevant information elicited when compared to some identical processes without facilitation (e.g., Offner et al. 1996, Anson et al. 1995). One way in which it appears to work is to counter a common trend in groups that results in the adoption of a 'satisficing' strategy in which a group settles for the first decision that proves satisfactory (e.g., with which no one greatly objects) rather than adopting an 'optimizing' strategy in which the group goes on to consider better alternatives (Rowe 1992).

In this case, facilitation (by HDRU, DEC, and CCE staff) was an important structural component of the public input process. Facilitation was used to improve elicitation and synthesis of information, from both stakeholders and managers. Both groups are susceptible to decision traps (like satisficing) that lead to premature closure of the problem-definition aspect of decision making.

In multiple interviews, AIM practitioners identified skilled facilitation as playing a critical role in SIG process implementations. Practitioners repeatedly expressed beliefs that HDRU support and assistance with the SIG process was essential to gaining useful stakeholder input. Staff also identified training and support to assist with AIM program design as cornerstones for AIM implementation. One practitioner framed these beliefs well during a series of interview comments.

> …I liked the process and the concept of using stakeholders and the issue education process, getting them to help identify the fact that they are experiencing impacts, and provide recommendations to mitigate those impacts. But, it seems like it's not an intuitive process for most of the stakeholders who are there. You almost have to coach them through it, because they immediately want to jump to the solutions, or their ideas for solutions. And so, it definitely takes some work and a well-informed facilitator. Part of me wonders that if we moved on, or say you took a position in Wyoming, and we were left to continue this process with a facilitator who doesn't have the background with the concepts and the way it's run in the past, my guess is we would have difficulty getting the facilitator to run the meeting as smoothly, and get the stakeholders engaged as well as has happened in some of our SIGs. Our staff has a good enough understanding, but the idea of using a facilitator to kind of allow the DEC [staff] to step back from the process to some degree, might be more of a challenge.

> … my concern would be, say we get a Cooperative Extension facilitator who isn't familiar with bears, who isn't familiar with the AIM process, or previous history with bear management, that some of the ways the meeting flows and possibly the outcome could be compromised by that. … for a facilitator who maybe does this as a private consultant or whatever, to step in and try to fill the role that you've played in some of these meetings, I think would be a pretty tough task. And we might not get the same value from the stakeholders for this specific process. Yeah, that's one concern I would have.
>
> … You know both this and the task force [Citizen Task Force] process we do for deer, facilitation is really a critical aspect of it all. Familiarity with the process, by facilitators, really determines the success of the meeting. I think internally at the various SIG meetings, we've got to plan for more –we've got divisional experience with this now—that training new staff and new biologists who come on board, how this process works. I think we can handle that pretty well, but, the facilitators I think, really would benefit from some guidance in how to use the AIM model. [R09]

Demonstrated success in addressing immediate challenges. Practitioner interviews revealed that a powerful incentive to continue using an innovation like AIM is the recognition that it produces success in addressing the immediate challenges that wildlife managers face.

> I think probably that the best reinforcement is success in solving management problems that people involved contribute to applying this methodology. And so where we have, you know, been successful in expanding areas of the state opened up to bear hunting, that didn't come strictly from the point of view of either achieving a population target, which I think might have been the way things were done previous to the whole AIM thing, or to meet a demand for hunting opportunity, but instead see how those components fit into a larger system considering the alternatives and having the sense of the public, both from SIG and the media analysis and everything else, to be able to accomplish the rule making, to make that a reality. [R06]

Impediments to adoption implementation

Synthesis of participant observations and practitioner reflections highlights the challenges that practitioners faced in this case, and in doing so, identifies potential impediments to future implementation of AIM by wildlife management agencies. Potential impediments include perceived attributes of AIM, as well as attributes of

wildlife agencies who would sponsor AIM and the professionals who staff those agencies (Table 4.5). The factors discussed in the remainder of this section relate primarily to AIM practitioner perceptions of trialability, relative advantage, and complexity of AIM as an innovation in stakeholder engagement.

Limits and capacity of staff. Multiple and competing time demands on staff represent a significant challenge to AIM implementation. Practitioners perceive themselves to be pulled in many directions, often commenting that they are "stretched too thin" and compelled to operate in a reactionary, crisis response mode.

> [AIM may fade out due to our] …ability to devote time to work on bear impact issues… I see us as a dwindling staff with more and more programs. At some point in time we are going to be doing everything with nothing. [DH]

> …one thing that I think is a reality out there is, you know, we have staff that's stretched out over lots and lots of different programs and the ability to maintain interest and or engagement in a particular issue is difficult and so, you know, a lot of times a lot of these issues are kind of an issue of the moment and then another emergency or brush fire, so to speak, comes up and we drop it. ... I think competing programs and priorities and issues don't often allow a staff person to really immerse themselves into an issue, in this case bear management, because the next phone call I get could be about deer or habitat projects, etc, etc. [R02]

The reactive mode used by wildlife agencies effectively precludes deep thought about any single management issue and creates little time or incentive for staff to think strategically. These findings suggest that AIM practitioners operating within state wildlife agencies will be reluctant to adopt and implement any innovations in stakeholder engagement that create additional time commitments, especially time commitments that address future rather than immediate challenges. Continued implementation of AIM will depend in part on the success of efforts to develop efficient mechanisms for AIM situational analysis and streamlined public engagement exercises that reflect the realities of staff time limitations within governmental

Table 4.5. Impediments to adoption and continued implementation of impact management by the Bureau of Wildlife, NYSDEC.

Attributes of impact management

- Terminology difficult to understand.
- Base documents difficult for some staff to read.
- SIG process more complex than closest referent process (CTF process for deer).
- Situation analysis can take a long time, much longer than closest referent process.
- SIG process does not provide quick, clear results to stakeholders (they do not immediately see how their input will be used in decision recommendations).

Attributes of sponsor agency (organizational structure and culture)

- Structural limits on staff time make it difficult for them to find time to do strategic planning, stakeholder engagement, or to be transactional (to give feedback to stakeholders)
- Structure of DEC creates challenges for communication and coordinated action by regional offices and central office.
- Staff turnover erodes institutional knowledge about AIM.
- Lack of a middle layer in BOW leaves few staff in a position to think like a manager.
- State administrations change regularly, creating instability in support for BOW initiatives.
- Professional culture that focuses on wildlife populations is an impediment to AIM thinking.
- Difficult to get value-focused thinking from upper administration
- Structure and function of DEC place low value on monitoring, so monitoring is weak or absent in many programs.
- Tendency to institutionalize processes, which become ossified and resistant to change.
- AIM emphasis challenges existing labels for management that have been in long-term use within DEC.

Attributes of AIM practitioners

- Feeling that "we are stretched to thin" and only have time to address the next immediate crisis; no time available for long-term processes.
- Stakeholder engagement is difficult and frustrating for staff to implement; they would rather do easier tasks.
- Expectation that actions cannot proceed without public input frustrates staff and stifles initiative.
- Staff worry that stakeholders won't do the work necessary to become informed participants, and then staff will be stuck with poor input.
- Lack of skills and confidence in identifying stakeholders, running processes, weighting stakes.
- Worry that stakeholders don't understand or consider ecological impacts.

agencies. By addressing inherent time constraints within wildlife agencies, improved mechanisms for delivery of an AIM approach will improve trialability of the innovation.

Maintaining institutional knowledge about AIM. Loss of institutional knowledge, associated with staff turnover, or less frequently with promotions of personnel out of a project team, clearly emerged as a threat to continued implementation of AIM. Staff attrition through retirements removed a significant portion of the personnel who were exposed to AIM concepts during the early stages of this case study (i.e., two of the three DEC collaborators on AIM foundational documents had retired by 2004; five of the eight original Bear Team members had retired by 2007; six of eight original members had retired by 2008). Practitioner interview comments, like those below, illustrate that agency staff are acutely aware of concerned about these challenges.

> …that a, 'big sucking sound' that you hear is that big draining of the institutional knowledge going down the board [through budget reductions that force attrition in staff size]. … I'm sensing that we are seeing a slow shift on the bear team to people, they have to learn a whole bunch of stuff over again, for lack of a better way to describe it [the sense that staff who are very new to bear management are replacing experienced veteran managers]. One of the values both to the Bear Team and the Deer Team, for a long time, there was a couple centuries worth of corporate [institutional] knowledge on there. Now as people retire and move on … that's going to create a vacancy on the bear team that's going to be filled with some newer guy who doesn't have the same breadth of experience that [name] had. … Turnover will slow the [AIM] process rather than speed it up. [R07]

A common problem identified by AIM practitioners was lack of training, especially for new personnel reassigned to fill a position vacated by a retirement.

> I mentioned earlier about having some kind of regional training about just how we do bear management. All the impacts management, the basics of that and how it

> applies to bears. And that would be a good start. And that's something that would be up to me or the other regional biologists to do with their own staff. Yeah, just try to get them at least a basis of how we approach it before somebody is gone. Yeah, usually what happens in DEC is somebody retires and says, "here's the files" to the next person, or, usually there's not even a next person when he leaves. You don't even know who to tell about it, so. [R02]

> …Some of the things [products] out of the bear team, when you look back on it, it's pretty impressive. It's the response manual and the framework document. You put all those together and for somebody new, I think that would be a great base to start from. And there wasn't anything like that when I started. [My training was] 'Yeah, you're the bear guy now – go do it.' [R03]

Given the potential for rapid attrition in institutional knowledge about AIM, continuation of AIM implementation will likely hinge on developing and sustaining learning relationships with new staff and leadership. Establishing routine mechanisms for new staff orientation to AIM principles and practices will be needed to retain institutional knowledge about the practice. One practice suggested to achieve these training needs is development of real-world case studies that demonstrate how AIM has been successfully applied by practicing managers.

> I think certainly one important component … is documenting the application to some real-world management challenges, so that it goes beyond the memory of the current Bear Team members from their direct involvement, and have things that are available in the literature and accessible to our colleagues outside of the bear world, whether it be wildlife or fisheries or whatever. Because I think where the value is and where it will get real use is when it helps us solve real problems as opposed to the more academic, or simply training for it's own sake. That people will give at least lip service and support some involvement [for those academic training exercises], but those are the things that tend to fade away if it doesn't have that daily application to helping to do your job. [R06]

Complexity of AIM concepts. AIM practitioners and stakeholders had difficulty grasping new terminology associated with AIM. Those difficulties translated into some initial frustrations for staff and participants.

> …I definitely like the idea of the impact approach. People definitely can grasp that. You know, a lot of the AIM stuff, even our professional staff had difficulty grasping some of the concepts, but impacts everybody seems to understand. And the public seems to understand it very well. [R02]

> I think that the nomenclature, the verbiage of the team I think is – I think was a bit of a stumbling block, not because the words don't mean what they mean, they're just different than what we've been doing over the years. Instead of just saying, … lets identify the impacts, you know, normally we would say – here's some problems. And so getting the team in particular and even myself thinking about different words or different ways to express that to the public was a bit challenging. However, now when I talk to the public I use AIM verbiage as often as I can. I don't just say, 'hey what do you guys think the problems are,' I really try to get people to say, 'you know, these are some impacts, both positives and negatives that bear populations present.' That's good. [R02]

Lessons learned from the first three pilot tests of the SIG process led to process revisions in a fourth and fifth application of the SIG process. The fourth and fifth implementation of the SIG process went smoothly and those processes were regarded as successful by participants and Bear Team members. The implication of these findings is that continued communication and training efforts will be needed to increase understanding of AIM concepts and reduce perceived complexity of AIM as a framework for management practices and decisions.

AIM compatibility with existing organizational structures. Compatibility with existing organization structures and practices also emerged as a potential impediment to continued implementation of AIM. An administrator who had worked closely with the Bear Team over time believed that AIM had been very useful to the agency, but he spoke of cautioning the team about the way that they positioned and promoted the practice, both to stakeholders and to the DEC Commissioners' office.

> From where I sit as an administrator, or Bureau Supervisor or whatever you want to call it, the reservation I would have, for lack of a better word, is that it probably means a lot more to you –the Bear Team—than it does to the public at large or the folks above me in the food chain. …I think one of the things that I've had to kind of caution the bear team about as well as work with the administration is to kind of

> de-emphasize AIM as a label, and talk more about the degree to which it formalizes or implements our mission, our legislative mandate, the principals of good government, the public involvement processes that are called for in the state rule making, and all those sorts of things, so that AIM itself doesn't become a target that needs to get defended or we have to sell it from square one. (R06)

The implication of such comments is that continued implementation of AIM is more likely to occur if practitioners can effectively communicate AIM as a set of conceptual tools that will help agency personnel become more effective and efficient within existing organizational structures. In other words, the organizational changes associated with AIM implementation may be more acceptable if positioned in a way that implies incremental or instrumental improvement rather organizational change that challenges the fundamental structure or functions of a state wildlife agency.

Findings and Discussion Part II: Project Outcomes

In Part II, I address my third case research question with respect to impacts (i.e., Does this pilot project provide evidence that AIM holds the potential to deliver outcomes that would improve wildlife agency performance?). The following subsections address case research question three by describing the range of outcomes produced in association with AIM implementation and the range of benefits that agency staff believe their agency experienced because they utilized an AIM approach.

An injection of resources, energy, planning, and momentum created during this cycle of bear management resulted in creation of many bear management products between 2000 and 2008, including: a standard operating procedure manual (DEC 2000, Henry et al. 2001), a framework for making bear management decisions and action recommendations (NYSDEC 2003a), a publication on black bear natural history and management (NYSDEC 2003b), identification of effects that stakeholders in New York regard as impacts (Siemer and Decker 2006), a stakeholder education video ("Living with New York Black Bears: Secrets to sharing the landscape with bears,"

available <www.dec.state.ny.us>), a bear management webpage (www.dec.ny.gov/animals/7215.html.), bear management education brochures and billboards, and the "Bear Management Digest 2008" (a compact disk of bear harvest records, bear-related complaint reports, and other data resources on bear management in New York, compiled for use by DEC staff). This level of investment and growth in the bear management program is unprecedented in the state. Before this period, black bear management was a background program that received relatively little public attention. With the creation of a permanent staff team to guide the program, and implementation of an AIM approach to bear management, the status and public visibility of the program was elevated markedly. By any metric, the period between 2000 and 2008 was a productive and dynamic chapter in the history of bear management in New York. Interview comments suggest that all DEC staff with responsibilities for bear management believe the products and processes developed during that time period improved the performance of their agency in multiple ways. Most notably for purposes of this case study, interview comments provide evidence that agency staff generally believed that adoption and implementation of AIM was one important element, within a larger body of work, that contributed to this organizational success story.

The following sections summarize case research findings of three types: evidence that AIM represents an incremental change in DEC's approach to stakeholder engagement in bear management, evidence that stakeholders who participated in a SIG process often experienced the outcomes identified in the SIG process logic model, and evidence that agency staff experienced several, but not all, of the outcomes that foundational AIM documents foretell. Collectively, these case research findings provide modest support for the conclusion that several of the benefits promised in AIM foundational documents were achieved or could be achieved

in the future if DEC continues to implement an AIM approach. Case study findings also lead to questions about the robustness of some underlying assumptions of AIM under conditions of actual practice (e.g., is it valid to assume that practicing wildlife managers can generate levels of public deliberation necessary to broaden decision frames crafted by wildlife agencies?).

Incremental change in approach to stakeholder engagement

One important outcome associated with implementation of an AIM approach for black bear management was an incremental change in the agency's approach to stakeholder engagement in bear management decisions. The level of communication and sophistication of stakeholder engagement in black bear management now rivals that given to the Bureau of Wildlife's highest profile program—white-tailed deer management.

This change represents an extension of the continuum of stakeholder engagement approaches described by Decker and Chase (1987). That continuum includes five approaches to stakeholder engagement: authoritative, passive receptive, inquisitive, transactional, and co-management. In the following subsections, I use those broad categories to characterize the history of stakeholder engagement in black bear management in New York, beginning over a century ago, in the government offices that preceded and would eventually become DEC.

The authoritative era (1900-1960's). The origin of DEC as a management agency traces back to the establishment of the Forest Preserve Advisory Board (FPAB) in 1885. The FPAB was renamed the Fisheries, Game, and Forest Commission in 1905. In 1927, the organization was renamed as the Conservation Commission. It remained so until 1970, when a major reorganization and expansion occurred, as the Conservation Commission was merged with other agencies to become the super agency DEC.

DEC's predecessors were formed in the authoritative era of management, when little or no stakeholder engagement took place. Authoritative approaches dominated the early decades of professional wildlife management and were still apparent into the 1960's. The advent of the environmental movement (late 1960's through the 1970's) is regarded by many as the era when requirements for more public involvement began to permeate state and federal agencies. Those mandates represent an official end of the authoritative period of stakeholder engagement in wildlife management.

The passive receptive era (1960's – 1970's). One can assume that BOW and its predecessor agency had always received some level of unsolicited input, but it was probably coming primarily from sportsmen and agricultural interests during much of the agency's first fifty years. The earmarks of a passive-receptive approach, however, are that the manager listens intently, but still determines the weight of the stakes (Decker and Chase 1987). Documentary evidence suggests that such listening only began taking place in recent decades. Creation of DEC as a super agency in 1970's is taken by many as clear evidence that state agencies of all kinds were put on notice to begin more intently listening to a cross section of different stakeholders (Nelson A. Rockefeller Institute of Government 1996). By the mid-1970's, planning documents released by the agency (e.g., NYSDEC 1976) were routinely including description of mechanisms used to obtain and/or consider public input. The mechanisms used to gain input were simple and passive, but widespread listening to unsolicited input became standard practice.

During the course of this study, members of the Bear Team who were working with DEC at that time recalled that DEC began receiving unsolicited complaints about problem interactions with bears between 1970 and 1975. The volume of complaint reports was low, however, so staff took no actions to establish a process to collect, standardize, or analyze stakeholder complaints.

The inquisitive era (1976 – 2001). The first evidence of an inquisitive approach appears in the 1970's, when a DEC biologist conducted personal interviews with campground users in the Catskills to gather information on human-bear interactions (O'Pezio 1977). That inquiry was followed by a survey of campground managers, corporate landowners, and private landowners in the Catskills in 1978 by HDRU (Decker et al. 1981). A resurvey of Catskill landowners was conducted by HDRU in 1983 (Decker et al. 1985, Decker and O'Pezio 1989). An inquisitive era of stakeholder engagement was well underway for deer management in New York during the 1980's, but bear management remained a low priority during that decade and no additional inquisitive work was done in the bear management realm until the 1990's.

In late 1992 and early 1993, DEC staff convened a series of meetings with representatives of interest groups in response to an ASPCA challenge to hunting cubs. An internal agency document (NYSDEC 1993) reported that the state's governor (Mario Cuomo) directed DEC to "work with concerned environmental and animal conservation groups to develop legislation that continues DEC's authority to manage and maintain the State's bear population without provision for the use of dogs in hunting or the killing of cubs" (NYSDEC 1993).

In response to the governor's directive, DEC staff expressed a willingness to meet with any groups interested in voicing their views on bear management in New York. DEC staff eventually met with representatives of 14 groups (i.e., the Adirondack Mountain Club; ASPCA, Citizens for Comprehensive Management; Conservation Fund Advisory Council; Environmental Planning Lobby; Fund for Animals; NYS Conservation Council; NY Farm Bureau; New York Houndsmen; NYS Humane Association; NYS Trappers Association; Sierra Club; The Wildlife Society; United Bear Hunters). Most of these meetings were with members of a single organization (i.e., they convened 13 meetings and met with 14 groups). A few of the

meetings occurred with a couple of like-minded groups. This approach stands in stark contrast to stakeholder engagement between 2001 and 2008. Interactions in the 1990's were conducted in an adversarial situation, which may be why DEC staff met with interest groups separately.

DEC completed a State Environmental Quality Review (SEQR) process in 1994, related to DEC proposals to: (1) institute a bear dog training season; (2) institute a ban on bear feeding within 500 feet of an occupied dwelling; and (3) disallow bear feeding within 9 days of the bear hunting season. Per the requirements of a SEQR, they opened an official public comment period on the proposed regulations. DEC staff prepared a SEQR response (DEC, undated document) documenting how the agency responded to public comment on those proposed regulatory changes.

The informed transactional era (2002 – present). AIM pilot project support documents take an explicitly transactional approach, which I define in chapter 2, Figure 2.3 as an informed transactional approach to stakeholder engagement. Establishment of the SIG process represents a first attempt for bear management in New York to engage stakeholders with managers in a deliberative process with two-way communication and feedback loops to stakeholders. This development comes more than a decade after transactional approaches came into use in deer management (e.g., citizen task force approach for deer management started around 1990).

Perceptions of SIG process expressed by stakeholder participants

I designed a post-exposure survey of SIG participants to address case study question 3 (i.e., "Does this pilot project provide evidence that AIM holds the potential to deliver outcomes that would improve wildlife agency performance?"). The instrument focused on the context for deliberation, mechanisms to enhance

participants' ability to process information, and perceived outcomes for participants (Appendix H-I).

Thirty-four of the 52 stakeholders who participanted in one of the first four SIG groups returned a completed questionnaire (response rate: 65%) (Table 4.6). Their responses are summarized below.

Table 4.6. Meeting attendance and questionnaire returns by stakeholder input group (SIG) location, for first four implementations of a SIG process.

Location	Attended at least 1 meeting	Attended all meetings	Returned an evaluation questionnaire
Upper Catskill	12	7	8
Lower Catskill	14	9	6
Allegany (western NY)	10	6	9
Region 7 (central NY)	16	14	11
Totals	52	36	34

Context for deliberation

Instruments for SIG post-exposure surveys included three sets of items designed to determine whether participants believed their process had focused group deliberations on problems of importance in their locale. Context items were modified to focus on the impacts identified during each implementation of the SIG process. Focusing on problems important to process participants is believed to create high motivation to process information (Rouwette 2003).

Findings from participant surveys indicate that the SIG process design was generally effective in focusing group deliberations on problems of importance in any

given locality. A majority of participants in the first four SIG groups agreed that all of the effects their group targeted for in-depth discussion were impacts that warrant management attention by DEC (Table 4.7). In most instances, the majority of participants reported that it was important to them personally that their group discuss the effects labelled by their group as impacts (Table 4.8). The findings presented in Tables 4.7 and 4.8 increase confidence that the SIG process used in this case was creating a context in which participants should have been motivated to process information.

Conversely, Table 4.9 illustrates that the structure of the SIG process is not likely to generate unanimous agreement on the topics for group discussion. For example, costs of apiary damage was not personally important to all SIG participants and some participants believed those effects could go unaddressed without serious consequences for area residents (i.e., they generally agreed those effects were important for DEC to manage, but they personally didn't see them as important and apparently believed no additional attention by DEC was warranted) (Tables 4.8-4.9). These findings point out that it is unrealistic to expect every participant to be highly motivated to process new information about every impact discussed in SIG meetings.

Mechanisms to enhance information processing abilities

Outcomes such as attitude and behavior change are more likely if the structure of a group decision support system (GDSS) facilitates information processing. Overall, results from SIG participant surveys were consistent with the presence of mechanisms for enhanced information processing (a necessary condition for central cognitive processing) (Table 4.10). Most participants believed that communication between group members and supporting staff was clear. They believed that diverse opinions were represented and that all participants had an opportunity to express and discuss their opinions. They believed that SIG process activities focused on bear

Table 4.7. Combined responses to the statement, "It is important for DEC to manage this impact [in the region where the SIG was held]" (SA=strongly agree; A=agree; N=neither; D=disagree; SD=strongly disagree)[3].

It is important for DEC to manage this impact in [region name].	n	SA	A	N	D	SD
Perception of threat from black bears, especially threats to children.	11	18.2	54.5	18.2	9.1	0.0
Level of understanding about the natural world.	11	45.5	45.5	0.0	9.1	0.0
Cost of bear-related damage to commercial property.	11	18.2	63.6	18.2	0.0	0.0
Long-term population viability of black bears in New York State (ecological)	8	75.0	25.0	0.0	0.0	0.0
Costs of bear-related damage to agricultural property (economic)	8	50.0	50.0	0.0	0.0	0.0
Costs of bear-related damage to non-agricultural, commercial property (economic)	8	37.5	62.5	0.0	0.0	0.0
Costs of apiary damage (economic)	9	44.4	33.3	0.0	11.1	11.1
Property damage and human safety risks experienced by homeowners (economic, health/safety)	9	22.2	77.8	0.0	0.0	0.0
Psychological benefits produced by viewing bears or bear sign (psychological)	9	22.2	55.6	11.1	11.1	0.0
Psychological costs produced by residential problems with bears	6	66.7	33.3	0.0	0.0	0.0
Psychological benefits produced by hunting (bear and deer)	6	100.0	0.0	0.0	0.0	0.0
Willingness of people to tolerate or co-existence with bears	6	50.0	33.3	16.7	0.0	0.0

[3] Rows made not add to exactly 100% due to rounding.

Table 4.8. Combined responses to the statement, "Failing to address this impact would have serious implications for residents [in the region where the SIG was held]" (SA=strongly agree; A=agree; N=neither; D=disagree; SD=strongly disagree)[4].

Failing to address this impact would have serious implications for residents in [region name].	n	SA	A	N	D	SD
Perception of threat from black bears, especially threats to children.	10	20.0	30.0	40.0	10.0	0.0
Level of understanding about the natural world.	11	36.4	27.3	27.3	9.0	0.0
Cost of bear-related damage to commercial property.	11	18.2	27.3	45.5	0.0	0.0
Long-term population viability of black bears in New York State (ecological)	8	25.0	50.0	25.0	0.0	0.0
Costs of bear-related damage to agricultural property (economic)	8	50.0	37.5	12.5	0.0	0.0
Costs of bear-related damage to non-agricultural, commercial property (economic)	8	25.0	62.5	12.5	0.0	0.0
Costs of apiary damage (economic)	9	11.1	33.3	11.1	44.4	0.0
Property damage and human safety risks experienced by homeowners. (economic, health/safety)	9	22.2	55.6	0.0	22.2	0.0
Psychological benefits produced by viewing bears or bear sign. (psychological)	9	11.1	44.4	11.1	22.2	11.1
Psychological costs produced by residential problems with bears	6	50.0	50.0	0.0	0.0	0.0
Psychological benefits produced by hunting (bear and deer)	6	66.7	33.3	0.0	0.0	0.0
Willingness of people to tolerate or co-existence with bears	6	83.3	16.7	0.0	0.0	0.0

[4] Rows made not add to exactly 100% due to rounding.

Table 4.9. Combined responses to the statement, "It was important to me personally that the input group focus on this impact" (SA=strongly agree; A=agree; N=neither; D=disagree; SD=strongly disagree)[5].

It was important to me that the input group focus attention on this impact.	n	SA	A	N	D	SD
Perception of threat from black bears, especially threats to children.	10	20.0	40.0	30.0	10.0	0.0
Level of understanding about the natural world.	11	27.3	54.5	9.1	9.1	0.0
Cost of bear-related damage to commercial property.	11	9.0	45.5	27.3	0.0	0.0
Long-term population viability of black bears in New York State (ecological)	8	62.5	37.5	0.0	0.0	0.0
Costs of bear-related damage to agricultural property (economic)	8	25.0	50.0	25.0	0.0	0.0
Costs of bear-related damage to non-agricultural, commercial property (economic)	8	25.0	50.0	25.0	0.0	0.0
Costs of apiary damage (economic)	9	22.2	44.4	22.2	11.1	0.0
Property damage and human safety risks experienced by homeowners (economic, health/safety)	9	22.2	66.7	11.1	0.0	0.0
Psychological benefits produced by viewing bears or bear sign (psychological)	9	11.1	55.6	11.1	11.1	11.1
Psychological costs produced by residential problems with bears	5	60.0	40.0	0.0	0.0	0.0
Psychological benefits produced by hunting (bear and deer)	6	66.7	33.3	0.0	0.0	0.0
Willingness of people to tolerate or co-existence with bears	6	66.7	16.7	16.7	0.0	0.0

[5] Rows made not add to exactly 100% due to rounding.

Table 4.10. Participant assessment of whether SIG processes utilized mechanisms that enhance participants' ability to process information (SA=strongly agree; A=agree; N=neither; D=disagree; SD=strongly disagree)[6].

	n	SA	A	N	D	SD
Communication between participants was clear and understandable.	33	15.2	81.8	3.0	0.0	0.0
Communication between participants and DEC staff was clear and understandable.	33	24.2	75.8	0.0	0.0	0.0
Communication between participants and process facilitators (Cooperative Extension) was clear and understandable.	33	12.1	78.8	3.0	6.1	0.0
Communication between participants and Cornell University staff was clear and understandable.	32	12.5	71.9	9.4	6.2	0.0
Everyone in the group had a chance to voice their opinions.	33	45.5	51.5	3.0	0.0	0.0
There was ample opportunity to discuss points where people had divergent opinions.	33	33.3	36.4	15.2	12.1	3.0
There was adequate opportunity for open and extensive discussion.	32	25.0	40.6	9.4	21.9	3.1
The process helped us focus on priorities for black bear management.	33	27.3	63.6	6.1	3.0	0.0
The process included people with diverse opinions on bear management.	32	37.5	50.0	6.2	6.2	0.0
It was clear to me how DEC intends to use input from the stakeholder group.	33	18.2	45.5	27.3	9.1	0.0

[6] Rows made not add to exactly 100% due to rounding.

management priorities. In summary, it appears that the SIG process was generally sound as a set of mechanisms to promote information processing.

In contrast to the overall results, two potential impediments to information processing were suggested by results from SIG participant surveys. First, the survey data show that AIM terminology was an impediment for some participants (Table 4.11). A few participants also believed that the process did not include enough opportunities for open and extensive discussion (Table 4.10). These particular findings suggest that future SIG process implementations may be more effective as a mechanism for participant information processing if techniques for communicating the impacts concept are refined and if the AIM process is modified to include greater opportunity for deliberative interchanges between participants and process sponsors.

Table 4.11. Results of semantic differential items on clarity and utility of the impacts concept as described by process facilitators or in the bear management planning framework.

n							
As described by process staff, the impacts concept was …							
31	Clear	29.0	32.3	29.0	9.7	0.0	Unclear
31	Useful for discussion purposes	29.0	38.7	22.6	6.5	3.2	Not useful for discussion purposes
As described in the *Framework* document, the impacts concept was …							
31	Clear	35.5	25.8	25.8	9.7	3.2	Unclear
31	Useful for discussion purposes	38.7	29.0	22.6	6.5	3.2	Not useful for discussion purposes

Outcomes of SIG process perceived by stakeholders

A majority of participants believed that the SIG process they engaged in produced a range of positive outcomes. For example, most process participants believed that their SIG process resulted in both instrumental and communicative learning. Most agreed that the process led to greater understanding of the priority impacts discussed and the opinions of other stakeholders (Table 4.12-4.13). They tended to agree that the process led to a shared vision of management priorities in their region (Table 4.12-4.13).

Table 4.12. Participant self reports about outcomes from SIG process (part I) (SA=strongly agree; A=agree; N=neither; D=disagree; SD=strongly disagree)[7].

The input group process . . .	n	SA	A	N	D	SD
Increased my understanding of the priority impacts we discussed in our meetings.	34	14.7	67.6	14.7	2.9	0.0
Helped our group reach a shared vision of the priorities for impact management in the western New York.	33	9.1	75.8	12.1	3.0	0.0
Improved my understanding of the opinions of the other participants.	34	20.6	64.7	11.8	2.9	0.0
Increased my level of trust in DEC as an agency.	34	17.6	41.2	32.4	8.8	0.0
Gave me insight into the possibilities for managing impacts.	34	8.8	70.6	17.6	0.0	2.9
Was an efficient way to get input for DEC decisions about black bear management.	34	17.6	64.7	11.8	2.9	2.9

[7] Rows made not add to exactly 100% due to rounding.

Table 4.13. Participant self reports about outcomes from SIG process (part II) (SA=strongly agree; A=agree; N=neither; D=disagree; SD=strongly disagree)[8].

	n	SA	A	N	D	SD
I learned more about the ways that black bears impact people.	32	12.5	68.8	12.5	3.1	3.1
My *group* gained insight about the ways that black bears affect people.	32	12.5	75.0	9.4	3.1	0.0
This process required participants to consider a broader range of viewpoints than they would have otherwise.	32	25.0	68.8	3.1	0.0	3.1
This process helped participants form a shared vision of priorities for black bear management.	32	12.5	78.1	6.3	3.1	0.0
The group considered management problems that I would not have considered otherwise.	32	9.4	53.1	25.0	6.3	6.3
The group considered management action alternatives that I would not have considered otherwise.	32	6.3	56.3	18.8	12.5	6.3
All the impacts that need attention in (your region) were discussed.	33	12.1	54.5	27.3	6.1	0.0
A broad range of useful solutions were discussed.	33	9.1	69.7	9.1	6.1	6.1
In the process the pros and cons of possible solutions were attended to.	32	6.3	62.5	21.9	9.4	0.0
The actions that participants suggested to manage key impacts were based on sound arguments.	33	12.1	45.5	30.3	9.1	3.0

[8] Rows made not add to exactly 100% due to rounding.

An important question in this case study was whether deliberative engagement techniques like the SIG process could influence the decision frames of stakeholders or wildlife managers (i.e., whether it could stimulate people to consider different values and action alternatives). Many SIG participants reported that their SIG group considered a broader range of viewpoints, problems, and management alternatives than they personally would have considered otherwise (Table 4.13). The majority of respondents believed that the process led to discussion of a broad range of action alternatives (Table 4.11).

Most participants considered the SIG process a good or very good way to clarify impacts and identify priorities for impact management in local areas (Table 4.14). Substantial minorities of participants, however, thought the SIG process was a poor way to identify the best strategies to manage impacts or to design area-specific management plans[9] (Table 4.14).

Perceptions of project outcomes expressed by AIM practitioners

In this section, I discuss practitioner perceptions related to achieving (or demonstrating achievement of) benefits expected to accrue to sponsors of an AIM approach. I analyzed interview transcripts with respect to whether a given passage of text suggested achievement or potential achievement of AIM-related benefits, or whether a given passage brought AIM assumptions or expectations for benefit attainment into question. The following sections summarize findings from that analysis.

[9] Action alternatives were discussed in SIG meetings to facilitate ends-means linking and to clarify stakeholder-defined impacts, not to generate formal action recommendations.

Table 4.14. Participant assessment of SIG process as a way to increase understanding of impacts and means to manage impacts[10].

How would you rate the stakeholder input process on the following:	n	Very poor	poor	good	Very good	Not sure
As a way to clarify how bears impact people in … (region).	33	0.0	6.1	42.4	48.5	3.0
As a way to identify which impacts matter most to people in … (region).	33	3.0	3.0	51.5	42.4	0.0
As a way to stimulate thinking about what might be the best management strategies (means) to achieve desired outcomes (ends) in … (region).	33	6.0	24.4	51.5	15.1	3.0
As a source of input DEC staff can use to set area-specific management objectives and plans of action.	33	6.0	30.3	48.5	15.2	0.0

Relative advantage

General agreement that AIM was useful to the sponsor. Nearly all participants found value in exercises to identify and clarify impacts. Despite some skepticism, participants tended to view AIM as a useful approach that synthesized multiple sources of information and organized the work of the Bear Team in logical ways. By the time practitioner interviews were conducted (in 2008), most practitioners made statements indicating that they found the AIM approach had great utility (i.e., when asked whether the AIM approach was worth the investment made by DEC, practitioners responded affirmatively, and prefaced their responses with statements like, "It's been great," "It's been monumental," or "It's changed everything"). One person described it as "a very good, very solid way to look at natural resource

[10] Rows made not add to exactly 100% due to rounding.

management." He thought of AIM as a useful "tool and thought process to engage the public, to have managers think about how to look at a problem or an issue."

> I think overall everybody on the team has been really pleased with the way we, with the products we've come up with out of this. And the way we approach impacts management really changed the basic way we look at bear management, I think. Far as I can tell everybody seems to be really pleased with that. Seems to be working, so yeah, I think it [impact management] is here to stay. [R03]

Extensive situation analysis was valuable to staff. Practitioners often commented on how useful it was to have multiple sources of information in their situation analysis.

> [on the topic of using multiple sources of input] …I think they are all beneficial. I think they are all building blocks, and the more you have, the more support you have for when you make a decision. Instead of just saying I had one meeting and we agreed on this. If you had a meeting and a survey and all these things are pointing you in a direction, I think yeah, the more the better.
>
> Again, I'm kind of new at this, so you know, I wasn't held fast to some old method; I wasn't bound to anything else from the past. But I think it [AIM] was worth the investment. It gets our Bear Team members talking about these things, and its important. We've seen some good results come from all of this. You know, we have gone and focused on education quite a bit, and I think we have only scratched the surface in what we would like to do there. Again, we are limited by funding and so forth, but a, we did open some areas to hunting, and changed some season date structures, and that all came out of those [SIG] meetings. So I think it was all a benefit. And to have that foundation, you know again, to justify what we do, is a good thing. [R01]

Practitioners often expressed appreciation for the research base created through their ongoing relationship with HDRU. Their comments leave little doubt that having access to a high quality database on the human dimensions of a wildlife management issue was valued.

AIM helped speed up the pace of regulatory changes. A perception that using AIM facilitated acceptance of regulatory proposals was perhaps the most tangible and direct benefit that practitioners associated with AIM. Regulatory proposals accepted during the course of this project cannot be attributed entirely to AIM activities. Nevertheless, multiple practitioners believed those proposals would not have been accepted without support from SIG processes and other facets of AIM for black bear management.

> Well overall, I think the whole thing has helped tremendously. … the successes the team has realized in season expansion. And I think a lot of that came from the SIGs understanding and [the SIG participants] saying education –fund it, and yet making it pretty clear that this bear team and DEC's management system –AIM—is a good one. And [the SIG groups saying] we trust in your judgment that when you document females with cubs in certain areas and complaint loads and road kills and that combination of three things and education at the same time lead you to open a season or make it concurrent in the Catskills, they're trusting our judgment and we've had successes for three years now I think. In expanding hunting areas twice and then making the Catskills concurrent – something's working because it's not New Jersey. We've got a management plan, we've got a framework document, we've got HDRU doing surveys, we've done our homework. We've got the documentation, we've got research supporting what we want to do and we've had public input. And, yeah, I definitely would say …in that sense, yeah, it [AIM] absolutely helped. [R05]

The pace of regulatory change within wildlife agencies can be very slow. Slow regulatory change is recognized by wildlife managers as constraint that limits management effectiveness by wildlife agencies. The following quote shows that some practitioners believed the AIM approach benefited their organization by accelerating the rate at which proposals were accepted.

> So I think we have been adaptive [in the past], but sometimes a management intervention just may take a couple years. Setting up a research program or something like that would take even more [time]. It depends, you know,

> sometimes things go amazingly well and other times there's a lot of things that slow you down. We opened up a bear hunting range in western New York, it took, I think, ten years to open that up in [DEC] Regions 8 and 9. We initially re-opened Region 8, to kind of expand the bear hunting area out there and we had a lot of public input. We didn't really have the identified impacts, you know, but we had tons of public input and support – it still took us about ten years – to get Regions 8 and 9 to agree, you know, on just an approach. Whereas now, you know, similar changes are accomplished in a year or two. So, for you, a year or two might seem long, but for me, it took a quarter or a fifth of the time it took before. [i.e., AIM helped them move much faster than they moved before]. [R08]

AIM helped staff articulate a statewide management plan. The original charge to the Bear Team was to develop a statewide, comprehensive management plan. Several practitioners regarded the AIM approach as helpful in getting the Bear Team to visualize their charge and finally achieve it. Thus, AIM had utility to the team in helping them achieve a task they had struggled with for several years prior to adopting AIM.

> I don't think they [members of the Bear Team] ever knew what they wanted and when we finally got a framework for a process, that was the answer. That was what they were really, I think, looking for. And I don't think they realized it and maybe some of them still don't fully realize it. But on the website, you know, that framework, that's sort of the comprehensive plan I think that they were looking for. And it's not, you know, a static thing carved out of marble. It's a very dynamic process, but a little hard to see for some of them. [R08]

> [Do you feel like you got there, that you got to what you think of as a statewide plan?] "To a black bear plan? Yeah, the framework [NYSDEC 2003a] is our guide. And it's on its second edition already, which I think is great. We've reviewed it and refined it. We've had a lot of things to add to it, historically, because we've had a lot of SIG meetings and so forth. You could even add another chapter, now that we've had the statewide [issue education] meetings since the last edition [of the framework] came out. So yeah, I think that is our management plan. [R05]

AIM approach "got everyone on the same page." During interviews, several staff correctly pointed out that not all the progress made in the bear program during

that time was attributable to use of an AIM approach. They noted that some of the products they produced during that period (e.g., SOPM, education video) advanced the bear program and were not associated with AIM implementation. Nevertheless, staff believed AIM was one element of a successful period in bear management. Several staff saw the AIM work as useful to DEC because it articulated a common protocol for all staff to use across the state.

Other advantages staff attributed to using an AIM approach. Several staff thought that the approach provided justification for regulatory proposals that made those proposals more defensible inside and outside the agency. Several staff noted that the AIM work led their agency to place more importance on problem prevention education/outreach as a management action, something that staff had not been able to achieve before AIM stakeholder engagement processes identified the high priority that stakeholders place on understanding bears and the causes of negative human-bear interactions.

Some practitioners expressed the belief that using an AIM approach increased the agency's credibility with the public. One person believed implementing an AIM approach moved the bear management program from a reactionary mode to a proactive mode—a big difference in his mind.

> All too often we were reacting in the past. To me, this was taking on the proactive view to the resource as it stands on the ground, perhaps as we go into the future. [R07]

Multiple staff noted that stakeholders who participated in a SIG process often expressed appreciation for being allowed to participate in the process. Stakeholders regularly made positive comments to agency staff during those SIG implementations,

which led staff to believe that SIG processes will demonstrate agency responsiveness to public desires for involvement in wildlife management decisions.

AIM encouraged more systematic thinking about bear management. As the quote below illustrates, some practitioners regarded the AIM approach as a stimulus to more rigorous and systematic thinking by DEC teams. The fact that AIM utilized a more structured decision recommendation process may ultimately have bolstered internal support for decision recommendations.

> Oh I think it was tremendously useful, yeah. Our whole approach to how we manage, not necessarily manage bear populations, but how we manage impacts—you know, negative encounters with humans—has changed tremendously since 2001. I mean, it used to be a haphazard approach. As near as I can tell in the regions, there really wasn't any organized approach or really any guidelines to go by. It was just seat of the pants. It was just on its own and depending on who handled it, it was completely different as a method of dealing with problems. But yeah, I think the main benefit of all this was that everybody's thinking the same way and we have things written down, and how to approach problems, and its all been created through speaking with the public and with each other. So yeah, it's great. [R03]

Learning opportunities

Staff learning. Most thought some learning was achieved. Several commented that they learned that stakeholder-defined impacts were in line with what they expected and were quite consistent across regions. Staff believed they were already aware of concerns and interests voiced, but the process increased staff confidence that their program was in tune with public interests and concerns (i.e., it was focused on effects stakeholders regarded as impacts). One person said "it really clarified what we were dealing with and how it all fit together."

Stakeholder learning. Staff thought the most learning occurred for stakeholders in SIG processes, rather than for managers. They thought stakeholders learned about other people's viewpoints and gained an appreciation for what DEC has

to consider and weigh (i.e., practitioners believed that the SIG process was achieving instrumental and communicative issue education).

> [Interviewer: What about the stakeholders; is this creating opportunities for them to learn?] I have to believe so. You know, the general public doesn't have the opportunity to interact with government all that much. And you see it on the news all the time, that we [the public] don't feel we have enough control in our lives at times, but this certainly empowers them to some degree. People are interested in that sort of thing. They're going to learn a little bit more about us. People kind of look at government in a two-dimensional way. But I think when they get to know us a little better, they have more trust in us as professionals. [R08]

> …When you first get into this and the public is telling you their concerns, yeah, that definitely is a learning opportunity for our staff, and any other staff that take this role on. The first time they get into it, it is going to be a learning experience. …And again, over time you start to see the same answers coming from the public. Now over time, those things can change, of course, as society changes, so there is still some opportunity for us to learn if something dramatic happens, but [most of the learning happens early in an AIM process]. [R01]

> [… do you feel like that created some learning or that either the bear team or the stakeholders learned as a result of taking that impacts approach?] "I think so, yes, I think that both the team and stakeholders both learned some things out of that on the impacts and the stakeholder meetings, in particular where you had to mix those different view points. I think that was probably a good format for people securing information and getting some different perspectives, and kind of we're seeing that they weren't alone with the ways they were affected by bears. …and one of things for us, too, for the bear team, at least for me, after holding the meetings in several different locations and seeing the same impact coming to the top all the time – it was kind of an eye opener. To see that, even though we were in different areas, with a lot of different circumstances a lot of times, people had the same concerns on things and so it felt like we were on the right track with our management. [R04]

Many expressed a concern that DEC could not reach many people with SIGs and so they are unsure whether any stakeholder learning is happening outside the SIG groups. They only have the potential to reach a larger audience through the BOW webpage and some educational materials, which raised questions in their minds about how to catalyze more stakeholder learning.

Influence AIM had on agency performance

Analysis of interview comments suggests that no practitioners thought AIM implementation hurt agency performance, and some clearly thought AIM implementation enhanced performance, in the sense that it helped them become more proactive, it catalyzed additional agency action in some areas (e.g., greater investment in bear problem prevention education), it helped them get approval of regulatory proposals, and it helped get that approval faster than in the past. Some had an "it's too soon to know" opinion on influence on agency performance, but they were guardedly optimistic that it could yield long-term benefits to DEC if done consistently into the future.

Deliberation

Many DEC staff believed that the SIG process had created more deliberation than public input approaches taken in the past, or at least had the potential to do so.

> [Interviewer: Do you think this was creating opportunities for that kind of deliberation?] Yeah, among the public and between the public and us, yeah definitely. Those SIG meetings, I think they [the public] took a lot of interest in talking out the issues and everything. And our [SIG] meetings, I think, were pretty civil. I didn't hear a lot of contradictions between people's thoughts or anything. They all worked very well together, but there was still a lot of deliberation back and forth, and people getting to express themselves. So yeah, I would definitely agree with that. [R01]

The problem though, which DEC staff recognized, is that implementing the SIG process in a few locations across the state will limit deliberative engagement to a small number of people. They recognize that it would be quite challenging to get more deliberation, given that their organization does not have the resources to offer SIG implementations in a given year.

Value-focused thinking (putting ends before means)

Impacts and value-focused thinking. Interview comments document that building stakeholder engagement around the concept of impacts was perceived by some practitioners as a valuable way to encourage value-focused thinking by wildlife management practitioners.

> I think where we are heading in wildlife management kind of goes back to the culture of the folks that we employ as resource managers. …One of the hurdles we try to get over is the mindset of some people that we manage for the animals themselves versus the value of that resource to people. And I think that by putting the emphasis on impacts, it helps reinforce that our charge really is to manage resources because of their values to people. [R06]

> …I think it [AIM] was monumental, in that we mentally got our focus off trying to manage individual numbers of animals, where we were actually looking at what those animals actually did to and with people. It was a whole shift in actually the, by my way of thinking, in the way that we manage bears. [R06]

Ends-means linking and value-focused thinking. Some staff felt strongly that efforts to focus on ends before means were useful and productive. Others were mildly positive on this; a few believed their organization already focused on ends that the AIM approach simply used different words to describe that process. Practitioner response seemed to differ depending on where the respondent was in their career. Some of the practitioners in this case deal entirely with day-to-day program implementation; they were disinclined to focus on ends and placed low value on exercises in strategic planning. Those with more longevity and more strategic interests saw value in tools like ends-means exercises, to encourage introspection about why their agency manages, before means become the focus of team deliberations.

> Yeah, well that was part of the learning process for me too. We all think we are ready to say "we want to go to hunting" or we want to do this or that, before we work through the entire process of why we want to do it and what objective we are trying to achieve. So I think it [the process] definitely gets

> you maybe almost thinking the opposite of what you went in there thinking, you know, the process [does that]. …It's good to answer the question why, and what exactly are you trying to achieve before you jump right into your actions. So I think it got us thinking a little bit differently than we might otherwise have been, and the public as well. Because they come to the table and the first thing they start talking about is how we are going to, or what we are going to do, as far as management actions are concerned, and we haven't even answered any questions yet. [R03]
>
> [ends-means exercises help practitioners focus on values] Certainly. Like with the bear team, everybody's jumping ahead to management intervention rather than going through the process of determining what the impacts are and how to address the impacts. And a lot of that is because, you know, pre-existing limited tools and stuff like that and sometimes, perhaps, they have gone through the process in their mind – just getting ahead of themselves. [R08]
>
> And this helps to put all that into perspective. So I asked myself, well for a – certainly for the public, sometimes it a little harder to see with staff, and even outside the bear team when I go to a [Bureau of Wildlife] Management Team meeting, and they are talking about a season expansion or something. You know, I have to see if I can get them to remember – "well, <u>why</u> are we doing that?," you know? And they get annoyed at me sometimes, but a. [For example…] We just expanded some hunting areas in western New York for last year or the year before and at the management team meeting, there's two things they could have done, they could have expanding the area [open to bear hunting] or they could have expanded the [bear hunting] season length. So a key thing was to abide by the impacts down there. And I was surprised that a manager realized the subtle differences between the two and, you know, the team members wanted to go for it [i.e. SIG process and the impacts that it identified helped the Bear Team think about what action proposals they wanted to make the management team]. So that was good, but it still emphasized that it's something we have to force ourselves to do sometimes – especially the higher levels of management – you're just looking at, you know, the action, and often they [the management team members] don't ask a lot – they just say what sort of agreement is there on this [proposal], not "why did you [a management team] want to do that?" But we have that answer [the answer to that why question] ready now that we've gone through this process, so that's good, and we can keep reminding them [the management team]. [R08]

The same practitioner believed ends-means linking exercises were valuable as a means to encourage value-focused thinking by stakeholders.

> I think this [AIM] process has really helped with the public – don't start out with 'How many days hunting season do you want?' or something like that. And you know, explore a little bit of the basics on bears and the effects and what the impacts might be and to go from there. Very often I think people are agreeing on the same final management action and they are actually hoping to achieve two different impacts. And you know they are not going to be happy [later]. You know you can say, 'Oh yeah, everybody's happy right now, we'll just go ahead with that action.' You know dog-gone well that they're not going to be happy very long, because they are hoping opposite things will result from that action. [R08]

Issue education

Some staff have been persuaded, through personal experience, that issue education can be helpful to teams of wildlife managers. The respondent below articulated this based on experiences as a deer manager.

> …I can definitely see that that's an effective education process for the stakeholders, in that, they are all sitting there together and get to share their perspectives and they can at least see the challenges that we as managers are faced with and that we're trying to balance all these different things. …And there's probably some compromise that they then make in their own minds about how bears can be managed just once they understand all the different issues. That's big. …I've seen some … people compromise [in a citizen task force for deer management] when they recognize the value of their stakes, and they leave much more varied than when they came in. So I definitely know that can happen, I just don't know that I saw that so much in the SIG [the one process that he observed.] [R09]

The same respondent also articulated concerns that it would be difficult for DEC to achieve issue education at a scale large enough to be useful in many cases. This respondent articulated another experienced-based concern that may be common among wildlife managers: stakeholders who have not experienced any DEC-sponsored issue education may play a dominant role in regulatory decisions about wildlife management.

> …I think the process worked well for small groups. But it's difficult to do education on a large scale. Because you're still at the mercy of, um, having the public interested and involved and engaged in what you are trying to inform them on. And a, I guess I could see the issue education worked well in the small group setting, when we're discussing their impacts with the bears. But, we can then take that and use that in the publications that we put out and whatever articles that we write, um. But we're still at risk of … we're not getting that message out to 100% of the people.
>
> …And I think that's one of the issues we face when we go to a formal regulation proposal that, in theory we are supported by the public and the stakeholders, but they have the opportunity to really have some issue education through that stakeholder process. Whereas the general public may not have had all that education. And a, so the rest of the general public is the one that is providing comment for our regulation proposals. [R09]

Summary, Discussion and Conclusions

This chapter presents case research observations and insights related to impact identification, impact clarification, and linking impacts to fundamental objectives for a black bear management program. The chapter describes how AIM concepts were put into practice and identifies impediments and catalysts encountered during a full implementation of impact management. Findings from a multi-faceted assessment were utilized to develop a post-hoc analysis of why particular impacts management concepts were adopted and implemented in this case. Findings presented in this chapter illuminate factors likely to influence adoption and implementation of impacts management within state wildlife agencies. I use the remaining subsections of this chapter to present impacts-related conclusions and to summarize implications for continued diffusion of AIM as a process innovation.

Catalyzing AIM adoption decisions

This case provides a useful example of the initiation stage that may be needed to gain an AIM adoption decision by wildlife agency leaders. Decision makers in the

sponsor organization were quick to accept a proposal to use AIM concepts as a basis for developing a comprehensive black bear management plan. That adoption decision was preceded, however, by a year-long initiation period, wherein HD specialists exposed DEC leaders in the sponsor organization to AIM concepts and engaged those leaders in AIM training sessions. One lesson from this case is that it may be necessary for public scholars to develop training and support relationships with sponsor organizations in order to cultivate the initiation experiences necessary to produce AIM adoption decisions by leadership in those organizations. The need for such relationships may decrease over time, as more examples of AIM implementation are established.

Catalyzing AIM implementation

Findings from this case study identified several factors that catalyzed continued use of AIM over a multi-year period. One critical factor was a strong climate for implementation provided by leaders in the sponsor organization. Commitment of resources and other support from leadership allowed for extensive HDRU involvement to support the Bear Team. Agency support allowed for HDRU to help agency staff develop planning documents, design and conduct stakeholder engagement processes, and work with managers regularly to complete activities like ends-means linking exercises. This case illustrates that AIM implementation must be adequately supported at an administrative level to be successful. One question that arises from this experience is, will this level of support be available when another cycle of AIM for black bear management begins? One of the broader implications of this finding is that public scholars will need to develop a strong climate before proceeding with any AIM implementation for a sponsor. Delaying an AIM initiative, or limiting the number of AIM initiatives by the sponsor may be preferable to implementing an effort that does not have the level of sponsor support necessary for

successful implementation. Capacity building, through staff development or external support, will likely be an essential part of building the climate necessary for AIM adoption and implementation in many wildlife agencies.

Although implementation was successful in this case, participant observation and practitioner interview comments identified a range of factors that could impede AIM initiation or continuation by any state wildlife agency. Many of the impediments identified (i.e., capacity of practitioners to implement AIM processes, loss of institutional knowledge about AIM, complexity of AIM concepts, compatibility with organizational structures) might be reduced through efforts to train agency staff on AIM concepts and processes. Experiences in this case suggest that adoption and continuation of AIM will depend on efforts of sponsors and public scholars to develop and deliver in-service AIM training to practitioners.

This case demonstrates that, in addition to training, practitioners will need access to HD expertise to facilitate some stakeholder engagement exercises associated with AIM. Whether that expertise is provided to practitioners by staff within or external to the sponsor organization, experience in this case implies that on-going relationships between practitioners and HD specialists will be key to facilitating AIM implementation. AIM implementation is likely to be slow and/or unsuccessful in sponsor organizations that do not integrate mechanisms for ongoing HD support to AIM practitioners.

AIM as a mechanism to enhance agency performance

Findings from this case study support assertions by Riley et al. (2003) that a well-implemented impacts management approach can create a range of outcomes that enhance wildlife agency performance. Many agency staff who participated in this work believe that AIM for black bears enhanced agency performance in multiple ways. They believed that focusing on impacts: (1) was useful to practitioners as a

means to obtain, synthesize, and integrate human dimensions considerations into decision recommendations; (2) helped speed the pace of regulatory change; (3) helped articulate a statewide management plan; (4) helped practitioners come to a common understanding of their problem and a common protocol for unified statewide response to that problem; (5) increased defensibility of decision recommendations; (6) increased public credibility of the sponsor agency; (7) increased sponsor's capacity to manage proactively; (8) encouraged systematic thinking about a management issue; (9) and led to instrumental and communicative learning by stakeholders and managers. Though modest in scale, the benefits perceived by practitioners in this case suggest that AIM holds enough potential value to merit further investment and development.

Challenging underlying assumptions of impact management

The data presented in this chapter provide some assurance that implementation was achieved to an extent that allows the researcher to examine underlying AIM assumptions under conditions of actual practice. Case research documents that this application of impact management was indeed designed to incorporate AIM concepts and most facets of the designed approach were implemented as designed.

Findings reported in this chapter provide support for several linked assumptions underlying AIM. First, the findings support the assumption that enhancing mechanisms for stakeholder engagement can stimulate deliberation. Second, findings support the assumption that increasing deliberation among wildlife managers, and between managers and stakeholders, can lead to learning by both. Third, findings support the assumption that focusing impacts and linking fundamental objectives to impacts, can encourage value-focused thinking.

Though results from this case study increase confidence in some basic assumptions underlying AIM, the findings also raise questions about the potential of AIM approaches to achieve the breadth and depth of public deliberation that may be

needed to challenge reconsideration of longstanding decision frames. In this case, an AIM approach did not identify any previously unrecognized impacts or deep specifics on impact categories already known to managers. Moreover, this case demonstrates how difficult it is to create deep or broad stakeholder deliberation, even when the sponsor organization provides a supportive climate for implementation. Those shortcomings bring into question the assumption that agencies can stimulate greater stakeholder deliberation and that greater deliberation will lead to change in decision frames.

Important questions face those interested in promoting adoption of AIM approaches. Those questions include: how do we get more of the benefits that were achieved to a modest degree in this case? How can AIM sponsors create more deliberation with and among stakeholders? How can agencies achieve the ideal of informed transactional stakeholder engagement? I address these questions in chapter 7, with a series of recommendations to practitioners, managers, and public scholars.

CHAPTER FIVE

CONSIDERING HOW MASS MEDIA AFFECT THE CONTEXT FOR IMPACTS MANAGEMENT AND IMPACT PERCEPTIONS

Introduction

Several untested assumptions about mass media are embedded in AIM as a conceptual framework. The developers of AIM assume that mass media analysis has the potential to inform an AIM approach to stakeholder engagement and decision framing. Ideally, a practice of AIM situational analysis should help practitioners understand discourse in mass media, as well as the ways in which media discourse influence perceptions held by both traditional and nontraditional wildlife management stakeholders. It is assumed that such analysis would contribute to successful application of an informed transactional approach to stakeholder engagement. It also is assumed that greater understanding about issue framing by media and wildlife management stakeholders could enable wildlife managers to foster more effective public deliberations about wildlife management policies and programs. Careful assessments of AIM implementation are needed to challenge media-related assumptions. This chapter addresses that information need.

The purpose of this chapter is to challenge assumptions about the ability of AIM sponsors to conduct and benefit from media analysis under conditions of actual practice. To achieve that purpose I present case research observations and insights related to media message analysis and media relations that took place for the black bear management program between 2002 and 2008. I draw on survey data, media content analysis, and AIM practitioner interviews[11] to conduct this aspect of the case study (detailed description of methods appears in chapter 3).

[11] Supporting quotes provided in the body of the text are illustrative rather than comprehensive. Full interview transcripts and analysis files are available and may be obtained by contacting the author.

The findings section of this chapter is divided into two parts. In Part I, I recount how media effects research was implemented as part of AIM situational analysis. After describing how a media component was developed and operationalized, I outline the conceptual framework that was employed as a foundation for media research in this case. In the final section of Part I, I summarize key findings from three media research projects conducted as part of an AIM situational analysis. Data collection for the media research component of the case focused on two embedded units of analysis (i.e., mass media and wildlife management stakeholders). Media research was designed to help practitioners understand the context for black bear management and possible influences of mass media messages on stakeholder concerns, risk perceptions, and behavioral responses to encounters with black bears.

Part II of the findings section focuses on outcomes associated with the media component of AIM implementation. It begins with a summary of practitioner perceptions about implementation and utility of media research within an AIM approach. Data collection for this part of the chapter focused on one embedded unit of analysis (i.e., interdisciplinary teams of wildlife managers). Based on data from practitioner interviews, I then identify potential catalysts and impediments to media effects research and media relations within an AIM approach.

I end the chapter with a synthesis of conclusions related to case research questions 1-3 as those questions relate to the topic of media effects research, media relations, and communicative stakeholder engagement within AIM.

Part I: Media Research as Part of AIM Situation Analysis

How media research was implemented

The rigor and depth of media message research associated with AIM implementation in this case is what sets it apart as an innovative practice for the

Bureau of Wildlife (BOW). Some level of media monitoring was taking place before AIM was initiated. For example, it was common for BOW staff to pay attention to media coverage about black bears and bear management, especially media coverage after some newsworthy human-bear interaction (e.g., coverage of BOW response to home-entry bear). These informal efforts by individual staff were qualitative, however, and were not part of any systematic effort to understand media content or effects.

Media effects research was implemented as an incremental step toward more in-depth and rigorous consideration of media influence on the context for black bear management. The human dimensions advisors in this case did not promote media research as a stand-alone innovation, and consequently, the question of whether a media research component should be part of the work was never subject to a formal AIM adoption decision by the Bureau of Wildlife (BOW). Rather, the Bear Team accepted HDRU proposals to conduct specific types of media use and media effects research elements as part of a multifaceted situational analysis.

AIM practitioner decisions and involvement related to each media research exercise are summarized in the next four subsections[12]. Human dimensions (HD) consultants completed all of the media research associated with the case. HD consultants engaged members of the Bear Team after each body of research was completed, providing briefings on study findings, leading discussion about the findings, and clarifying implications of the research for continuing implementation of AIM for black bears. But it is important to note that members of the Bear Team had much less direct involvement in media-related work than they had in the impacts and systems thinking components of the case. From the perspective of an AIM

[12] Research methods are discussed at length in chapter 3. Methods are referred to here only as a device to organize summary comments on the degree and kind of involvement that AIM practitioners had in each research exercise.

practitioner, media research was an activity occurring independently and in the background.

Statewide mail survey

The statewide survey of bear management stakeholders, implemented in 2002, was a central element within AIM situational analysis. Members of the Bear Team were involved in a collective decision to make media use by stakeholders part of the situation analysis.

In the short term, the Bear Team requested that their new research initiative on bear management fulfill DEC's immediate information needs about management stakeholders (e.g., characterize stakeholder experiences with bears, attitudes towards bears, and views about hunting and other management actions). HDRU staff engaged members of the Bear Team to design a survey instrument that would address those short-term information needs, but also would address information needs associated with AIM situational analysis. Accordingly, the instrument included sections devoted to identifying positive effects (interests) and negative effects (concerns) that might rise to the level of an impact for various stakeholder groups. During the instrument development phase, both DEC and HDRU staff expressed strong interest in utilizing the statewide survey as an opportunity to explore potential effects of media use on stakeholders' impact perceptions. Both HDRU staff and DEC staff believed a media element should be part of situation analysis because media framing of bear management issues might influence stakeholder perceptions of bear-related impacts. A media component was adopted as part of the stakeholder survey because it was relatively easy to do and was also consistent with beliefs and assumptions held by members of the Bear Team.

Mass media content analysis

In 2001, HD staff proposed that a media content analysis be considered as part of situational analysis. After a bear-related human fatality, HD researchers proposed another media content analysis. Both proposals were readily accepted by the Bear Team. Reflection on those decisions led me to conclude that media content analysis was readily accepted because it held inherent interest for Bear Team members and required no additional time commitments or expertise from team members (i.e., all analysis was conducted by HD consultants). This portion of situational analysis would not have occurred in the absence of external research capacity.

Post-fatality telephone survey

A bear-related human fatality occurred in New York on August 19, 2002, just a few months after the 2002 statewide survey of bear management was completed. HD researchers met with the Bear Team to propose that BOW fund additional survey research that would measure risk perception and a few other concepts assessed earlier in the year. Members of the Bear Team embraced the idea that pre-post fatality data would allow for hypothesis testing, while simultaneously providing practical information on whether public opinion on bears had shifted after such a unique human safety event. Representatives of the Bear Team proposed and obtained authority to redirect BOW resources to fund this research proposal.

Reflection on this portion of the project led me to conclude that the proposal to do a post-fatality telephone survey was readily accepted because it required no additional time commitments or expertise from team members (i.e., all analysis was conducted by HD consultants), and Bear Team members believed the research could have immediate practical utility. This was another portion of situational analysis that would not have occurred in the absence of external research capacity.

Analysis of influences on risk perception

During development of the 2002 stakeholder survey, HD staff proposed that the survey instrument be constructed to permit quantitative analysis of factors that influence perceived risk or other stakeholder perceptions that hold practical importance for bear management decisions. That proposal was readily accepted by the Bear Team. Reflection on that decision led me to conclude that quantitative analysis of influences on risk perception was accepted because members of the Bear Team trusted the judgment of HD staff and the proposed analysis required no additional time commitments or expertise from team members (i.e., all analysis was conducted by HD consultants). Like the other media analyses, this portion of situational analysis would not have occurred in the absence of external research capacity.

Conceptual framework that guided media research

Because stakeholder-defined impacts are the foundation of an AIM approach, it stands to reason that inquiries that help wildlife managers understand how impact perceptions are formed or influenced could be a useful addition to AIM situational analysis. Research on stakeholders' media exposure, personal experience, and interpersonal communication may be a useful part of situational analysis because all three are thought to influence formation of impact perceptions by stakeholders.

Preparations for a media research component in AIM implementation included development of a conceptual framework for research on linkages between media frames, individual frames, and outcomes of framing. Figure 5.1 was developed as a schematic to discuss possible media effects and media research with members of the Bear Team. The following subsections summarize hypothesized linkages in that conceptual model.

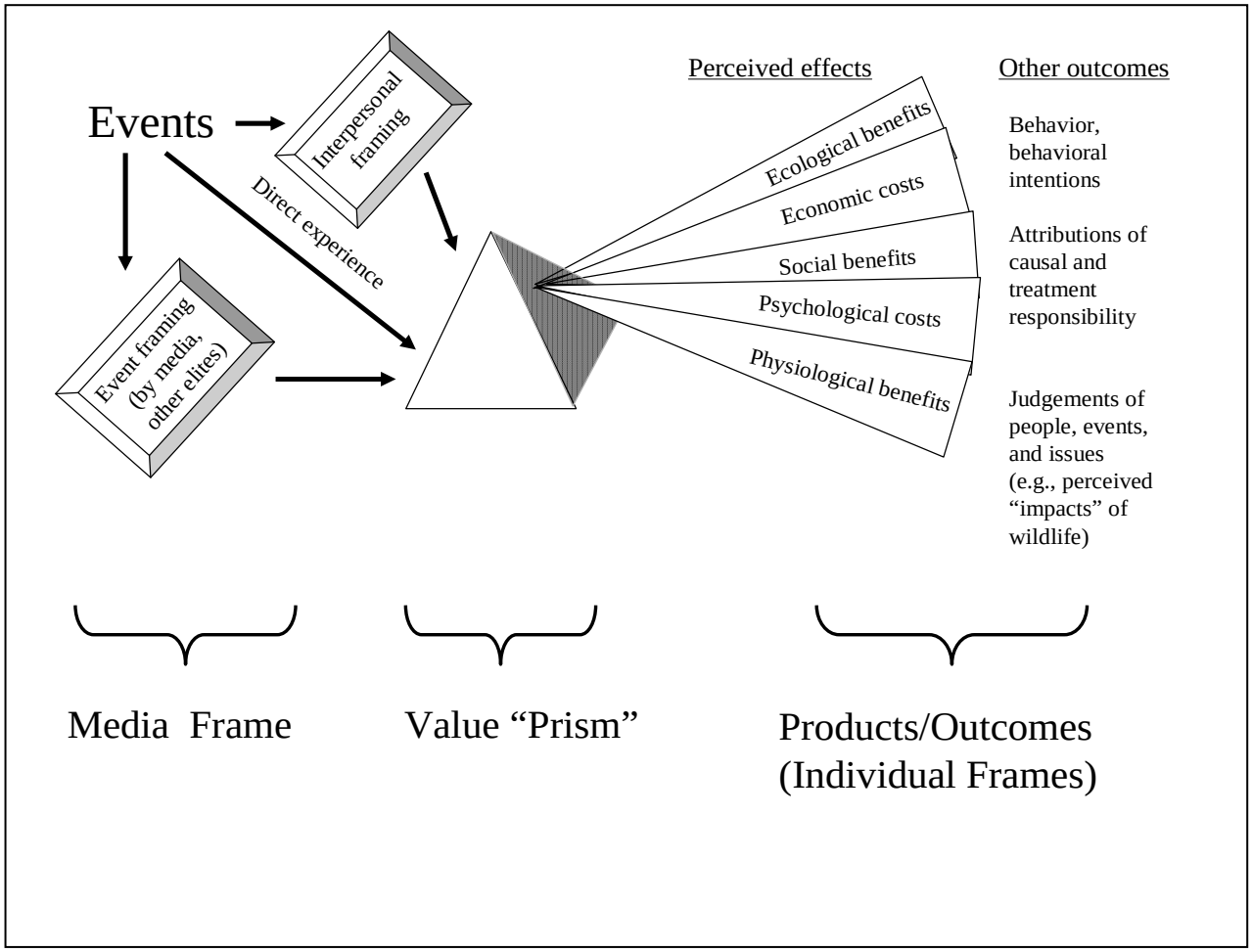


Figure 5.1. A schematic diagram of conceptual linkages between media frames, individual frames, and outcomes of framing, used for communication between AIM practitioners and media research team.

Mass communication, risk perception and risk acceptance

The likelihood of being injured by a black bear in North America is very low (Herrero 1985, 2005; Herrero and Fleck 1990). Nevertheless, maintaining human safety has become a greater concern in states like New York, where negative human-bear interactions increased during the 1990's. Very few people will directly experience a bear-related threat, so wildlife managers are particularly interested in understanding how or if risk perception is influenced by exposure to media coverage about bear attacks on humans or their pets.

Because wildlife attacks have immediate and sometimes catastrophic consequences for the people involved, wildlife researchers speculate that media coverage of such attacks may create increased dread, elevated risk perception, and reduced support for species conservation among some stakeholders (Riley and Decker 2000a). Wildlife acceptance capacity (Decker and Purdy 1988) may be reduced among stakeholders who, through direct experience, interpersonal communication, or mass media exposure, come to perceive an animal as a threat to themselves, their pets, or their livestock (Saberwal et al. 1994, Riley and Decker 2000b). Wildlife professionals have documented a few cases where widely publicized wildlife attacks on people precipitated intense public reaction and sudden shifts in wildlife management policy (e.g., Thompson et al. 2003), including greater use of lethal management responses (Miller and Tutterow 1999, Thompson et al. 2003). However, change in public perceptions after a wildlife attack and the reasons for perception change are not well documented.

Kasperson and associates (Kasperson et al. 1988, 2001; Kasperson 1992) suggest that a process called social amplification of risk can lead to change in risk perception. The social amplification of risk framework (SARF) is summarized in Flynn et al. (1998:716).

> Basically the model states that once a safety event enters the process of social communication, awareness and concern about that risk often increases and initiates individual and group behaviors. Information about risk, broadcast through the mass media and producing widespread concern, can result in important social, economic, and political impacts.

News stories about wildlife often focus on negative wildlife-human interactions (Corbett 1992), and coverage increases after a dramatic event like a cougar (*Puma concolor*) attacking a human (Wolch et al. 1997). The fact that negative human-wildlife interactions have news value raises basic questions about how mass media may affect perceptions of wildlife.

People develop some beliefs about wildlife through personal experience, but personal experience varies by species. In a suburban area with a high white-tailed deer (*Odocoileus virginianus*) population, for example, humans are likely to have frequent interactions with deer. A recent survey documented that over 80% of homeowners living in the residential neighborhoods surrounding Cornell University see deer almost daily (Siemer et al. 2007a). The same residents are less likely to have interaction with black bears, which exist in their general area but are much less common and more reclusive in behavior. In situations where people seldom interact with large carnivores, it is reasonable to assume that their beliefs about those species are informed more by mass communication (print and electronic media) or interpersonal communication than by personal experience. A 1997 study in Montana provides a good example (Riley and Decker 2000b). Fewer than 5% of state residents had personally experienced a cougar threat to themselves, their pets, or their livestock. About 36% of residents had seen a cougar in the wild at least once in their lifetime. However, the majority (68%) had read of cougar attacks on people or domestic animals and over 80% had been exposed to information about cougars through wildlife-related television programs, videos, movies, or news media.

Researchers are beginning to explore the role that mass media play in creating perceptions about large carnivores. Riley and Decker (2000b) hypothesized that media coverage of dramatic wildlife events, like a cougar attacking a person, can significantly influence public perceptions of cougar abundance and distribution, as well as perceptions of the threat cougars pose to humans. Other researchers hypothesized that media coverage of bear attacks on people negatively affect efforts at bear conservation (Herrero 2005). For example, Miller and Tutterow (1999:250) report that 'defense of life or property kills' in Alaska "appear to increase following newspaper accounts of attacks by bears and deaths caused by bears." Studies are needed to test hypotheses about change in the relationship between media use and perceptions of wildlife-related risks. This case included research to test the hypotheses that risk acceptability is lower and concern about bear-related hazards is higher among stakeholders with the greatest exposure to mass media reports.

Personal experience and risk perception

Past research provides a basis for expectations about personal attributes and personal experiences likely to be associated with acceptability of and concern about bear-related safety hazards. Some studies have found an inverse relationship between risk perception and personal experience with a wildlife species. For example, a survey in the Catskill region of New York State (Decker and O'Pezio 1989) found that concern about negative interactions with bears was lower and acceptance of bears was higher among landowners who had experienced interaction with bears. These findings support the idea that personal experience reduces uncertainty about the consequences of living in proximity to a given species, which reduces concern level and risk perception. Risk literature suggests that people tend to be less concerned about familiar hazards as compared to novel hazards (Fischoff et al. 1978, Slovic et al. 1980). This case examined hypotheses that concern about bear-related safety risks is

lower and acceptance of safety risks associated with black bears is higher among people who have more personal experience with bears.

Value orientation and risk perception

Some research has shown that people who perceive benefits from a wildlife species tend to be more tolerant of problem interactions with that species (Decker et al. 2002). Research for this AIM implementation examined hypotheses that concern about bear-related safety risks is lower and acceptance of bear-related safety risks is higher among people with a high wildlife-benefits orientation.

Personal attributes and risk perception

Multiple studies have found that concern about human safety is higher among women than among men with respect to a range of technological hazards (Davidson and Freudenburg 1996, Gustafson 1998). Some empirical evidence indicates that women are often more concerned than men about the safety risks associated with potentially dangerous wildlife (Zinn and Pierce 2002), and nonhunters are more concerned than hunters about wildlife-related threats. Those findings led us to consider several personal attributes of stakeholders as exogenous variables to control when analyzing survey data for possible media effects on stakeholder perceptions or behavioral intentions.

Outcomes associated with framing

In addition to perceived effects associated with events (e.g., ecological benefits, economic costs), the outcomes of framing include attributions of causal and treatment responsibility (Iyengar 1996), and judgments of people, events, and issues. Researchers have found some support for the hypothesis that news framing can influence people's interpretations of information and their judgments related to social and political issues (Gamson 1992; Iyengar 1987, 1991; Price et al. 1997; Price and

Tewksbury 1997, Rhee 1997). In this case, research was conducted to document attributions of causal and treatment responsibility in media stories between 1999 and 2002, and to explore hypotheses about the relationship between media use, value orientation, and one measure of behavioral intention (i.e., predisposition to contact authorities for field intervention during a human-bear interaction).

Key research findings

Situational analysis in this case included three distinct research projects that contained a media component (Table 5.1). In the first project, content analysis was used to characterize the messages being communicated to New York State residents during a 3-year period preceding implementation of a statewide mail survey of bear management stakeholders (Siemer et al. 2007b). In the second project, data from two stakeholder surveys and a media content analysis were analyzed to clarify how media messages about the first bear-related human fatality in New York State affected stakeholders' risk perceptions related to black bears (Gore et al. 2005). The final research project used data from the 2002 stakeholder survey to examine factors that influence stakeholders' risk perception, concern about black bears, and predisposition to request field response to a human-bear interaction (Siemer et al. in review). In the following sections, I summarize key findings from those projects and how those findings relate to information needs within an AIM situational analysis.

Media content 1999-2002

Messages about impacts. Siemer et al. 2007b documented that mass media coverage of bears and bear management had a narrow focus between 1999 and 2002. Most media reports focused on problem interactions with bears (39%), bear hunting (27%), or the need to educate people to avoid bear-related problems (22%). Reports identified a short list of effects from problem interactions with bears, most notably

Table 5.1. Media effects research conducted as part of AIM situational analysis.

Research focus	Time of data collection	Concepts examined	Related publications
Media content during emergence of a bear management issue	Spring 2002	• Social amplification of risk framework (SARF) • Bear-related effects and interactions mentioned in news stories • Episodic and thematic framing of bear-related stories • Bear-related problems identified by media • Attributions of responsibility for problem creation • Bear management solutions suggested by media coverage	Siemer et al. 2007
Analysis of risk perception before and after a bear-related human fatality	Spring-fall 2002	• Social amplification of risk framework (SARF) • Wildlife-related human fatalities as focusing events • Risk perception • Human health and safety impacts	Gore et at. 2005
Factors that influence concern about black bears and predisposition to request field response to a human-bear interaction	Spring 2002	• Social amplification of risk framework (SARF) • Value orientation as an influence on concern • Experience with black bears as an influence on concern • Print media use as an influence on concern • Television viewing as an influence on concern • Concern about bear-related health and safety threats • Predisposition to request field response by wildlife authorities	Siemer et al. In review

fear arousal or economic effects associated with property damage by bears. Twelve percent of articles mentioned no bear-related effects on people. The majority (61%) of articles mentioned two or fewer, and 76% mentioned three or fewer effects; only 10% mentioned four or more effects. A negative psychological effect (e.g., fear of being injured by a bear, frustration about bear-related problems) was mentioned in 71% of stories; 45% of stories mentioned an economic effect (e.g., damage to commercial or residential property); 35% mentioned a safety-related or social effect; and 28% mentioned a management effect (e.g., public reaction to hunting or treatment of individual bears). Only 13% mentioned an ecological effect (e.g., concern about how bears affect other wildlife or how people affect bear population viability).

Content analysis documented that some important dimensions of human-bear coexistence were conspicuously absent. For example, few news stories available to residents of New York discussed the relationship between land use or land development and black bear population viability or human-bear interactions. In New York and many other states with bear populations, development pressures are increasing. Residential and commercial use of land, conversion of forested land to agricultural uses, and road building are but a few of many land-use patterns that have important implications for management of black bears and other wildlife. Connections such as these were not often made in the stories available to stakeholders in New York. Lack of public dialogue about these kinds of topics means that effects related to development are not discussed, and so are unlikely to be recognized by stakeholders or considered by stakeholders as impacts to be managed. HD researchers pointed out to the Bear Team that this should be reason for concern if it is effectively narrowing the frame for bear management decisions.

Media framing of management problems and solutions. Content analysis suggested that much of the media coverage available to people in New York between 1999 and 2002 was prompting people to think of negative interactions with black

bears as a personal problem, not a public issue. Most bear-related news stories (84%) available in New York used an episodic frame and emphasized individual responsibility for creating and solving bear-related problems. Stories that mentioned problems with bears often packaged that information with causal explanations and potential solutions that implicated personal behavior and personal responsibility (e.g., problems result from careless human behaviors that attract bears; the solution to such problems is educating people about making personal behavior changes). A minority of stories offered a broader array of potential solutions (e.g., better waste disposal practices, increased bear hunting, relocating bears, or lethal control of problem bears) appropriate if bear problems are considered a public issue rather than a personal problem. Siemer et al. 2007b argue that the ultimate effect of such media coverage is to narrow the focus of discussion among wildlife managers and stakeholders. They suggested that such media coverage should be reason for concern among wildlife managers if it is contributing to poorly-defined bear management problems, because accurate problem definition is an essential part of making smart choices (Hammond et al. 1999) about the actions and policies of a wildlife management agency.

Implications within an AIM approach. Documenting media coverage from 1999-2002 helped managers in New York State understand more about the context for decision making during AIM implementation. Media content analysis helped demonstrate that media coverage about black bears and bear management was typically episodic and narrowly focused. The HD team suggested that the absence of thematic coverage of black bear management, combined with the limited focus of news stories, might be contributing to an oversimplification of bear management and the dynamic complexity inherent in managing a system that involves feedback from human and natural systems. It was pointed out that when issues are oversimplified, decision makers run a higher risk of taking actions focused on the wrong problem. Moreover, it was pointed out that interdisciplinary teams of wildlife managers can

address that challenge by helping stakeholders reframe bear management issues as new information becomes available.

These research findings and conclusions were discussed with the Bear Team during regular team meetings. The HD research team suggested that wildlife managers could expect such coverage to narrow public discourse about bear management and perhaps set the context for poor definition of bear management issues during stakeholder engagement exercises. HDRU staff suggested that if BOW managers want stakeholders to recognize ecological or other effects, the agency should take measures to communicate with stakeholders about those effects. It was pointed out that if broader public discussion about black bear management is desired by BOW, they should consider working more closely with journalists or investing resources in public issue education programs that help stakeholders consider broader problem definitions and potential management responses than are offered by mass media as public issues emerge.

Media messages and risk perception after a human fatality

Media coverage after the fatality. As expected, a spike in media coverage occurred after the bear-related human fatality in New York. But contrary to expectations, news coverage overall did not communicate a heightened risk message. Gore et al. (2005) identified 45 stories (27 newspaper articles and 18 telecast transcripts) in major newspapers or television broadcasts available in New York in the 30 days following the human fatality. Most (87%) of those stories were distributed or broadcast within 6 days of the event. About 90% of the stories in the sample mentioned the fatality. The majority of articles (60%) included a statement indicating that such fatalities are rare, while only 11% included a statement indicating that bear-related risks to humans were increasing.

Media use and stakeholder risk perception. Gore et al. (2005) found that media coverage generated widespread public awareness of the bear-related human fatality in

New York, but produced no evidence that such coverage elevated risk perception. Residents living in four geographic areas across New York State were contacted before and after the fatality and asked whether they agreed that the risk bears present to human safety are acceptably low. About 77% of respondents reported that they were aware of the event, with most becoming aware by watching television broadcasts (53%) or reading newspaper stories (26%). Contrary to research expectations, acceptability of risk was actually slightly higher (87% vs. 81%) after the fatality. The researchers concluded that, "Stability in risk perception may have been reinforced by media coverage that uniformly characterized the risk of being attacked by a bear as extremely low" (Gore et al. 2005: 507).

Implications within an AIM approach. AIM practitioners had an interest in funding this part of the situational analysis because they believed that media coverage of a bear-related human fatality might generate elevated public risk perception, and perhaps, public pressure for additional lethal control of problem bears. Those outcomes did not occur (i.e., media coverage did not create social amplification of risk and the fatality was not seized by interest groups as a focusing event demonstrating the need for rapid policy change). This research was useful to the Bear Team because it provided quantitative information showing stability in public risk perception, and it provided a research-based explanation for pubic response to a bear-related human fatality.

Gore et al. (2005) concluded that media coverage after the bear-related human fatality did not create social amplification of risk and was not a "focusing event" that led interest groups to lobby for change in bear management policy. But in AIM practitioner interviews, conducted several years after that event, it became clear that BOW staff *did* consider the fatality to be a focusing event within their agency. They believed the event made it possible for the Bear Team to gain acceptance from agency

decision makers to fund media research, expand problem prevention education, and expand areas open to bear hunting.

> […in this case the Bear Team kind of lobbied for us to get additional money to do that follow-up telephone survey, to find out if people's risk perceptions had changed. So there was probably more related to media in this project than there might typically be.] Yeah, I think we sold that as a CYA-type thing to the upper levels of leadership. They certainly didn't want to see a repeat fatality. As much as we could do to make them feel comfortable, I think they were willing throw dollars at. [R07]

> [Do you feel like any of that media work or that work in general was useful to the team?] Absolutely. Because it's bad that it takes a fatality to get everybody's attention. And yet, at the same time, I think the people need to be made aware, you know, this is not Walt Disney – this is a creature that can kill you …We soft pedal our message but then when that poor infant gets grabbed out of a stroller, then we're putting out the fires. …our message – don't feed the birds, a fed bear is a dead bear, that's all neat and catchy but the weight behind it is a little soft. … So the things that you guys found out and did, yeah, you know, and the [education] DVD, and [name of staff person] and other people that had to react to the Catskills fatality – that was all fine and good – and it's a flare-up of – we can't get anything in the paper and now we are all over the paper. [R05]

Media research associated with AIM implementation was valuable to BOW because it helped AIM practitioners understand and quantify the value of skilled media relations. Recommendations discussed in Gore et al. (2005) were offered to AIM practitioners during regular meetings with the Bear Team. The HD team highlighted potential agency benefits associated with working with mass media to achieve an agency's risk communication goals. Having additional media research elements in this case allowed practitioners to demonstrate (to themselves and to agency leadership) that BOW can work with media to improve congruence between actual and perceived risk among wildlife management stakeholders.

By adding media elements to AIM situational analysis, this case demonstrated that a wildlife agency can handle media relations effectively and help media send

useful messages during an incident like a wildlife attack on a person, but that agencies could benefit from capacity development to influence media frames, enlarge those frames to consider additional problems and solutions. Media relations were successful after the fatality because BOW had a seasoned and skilled risk communicator in place when the fatality occurred and that professional conducted most of the agency's media relations response after the fatality. This research documented that media messages about risk were relatively accurate, and the research substantiated the impressions of practitioners that media relations by the agency contributed to that positive outcome. The HD team suggested that BOW could continue to work with media to provide risk communication and encouraged them to increase their capacity to conduct media relations after such incidents.

Of the three media research elements, media research after the human fatality was valued most by AIM practitioners. One benefit of the work that several practitioners mentioned was increased confidence in findings of situational analysis completed prior to the fatality. Data collection after the event reassured Bear Team members that their understanding of the management environment was still valid after the fatality. Without the media research they would have been left wondering whether some of the survey data gathered earlier was still an accurate portrayal of stakeholder opinion. Many wondered if such a rare and troubling event would significantly change public sentiment about black bears and attitudes about bear management. Media research was a relatively inexpensive way for the Bear Team and upper level decision makers in the sponsor agency to gain reassurance that their understanding of public sentiment remained valid after the event.

Media effects analysis

Influences on risk perception. Personal attributes, personal experiences, and value orientation were hypothesized to be predictive variables in models for risk perception. Stepwise logistic regression models were fitted to the 2002 mail survey

data to test hypothesized relationships between risk perception (dependent variable) and personal attributes, bear-related problem experiences, print media exposure, and television viewing. The question explored in this analysis was whether media use variables are predictive, especially when used in a combined model with personal characteristics and experiences. To explore that question, a set of 3 regression models was developed. Risk perception (dependent variable) was measured as agreement with the statement, "The risk of being threatened by a black bear are acceptably low." Model 1 was a media-only model (model 1) that included just 2 variables (i.e., hours of television viewing per day and readership of wildlife-related newspaper articles). Model 2 combined media use variables with variables on personal attributes and personal experiences. Model 3 included main effects from the combined model and interaction effects among predictive variables in the combined model (model 3). The best models are summarized in Table 5.2. Results of these analyses did not support the hypothesis that risk perception would be predicted by print media use and television viewing.

The model chi square for the media-only model was significant ($p < 0.001$) and television exposure level was a predictor variable (Table 5.2). The probability of being in the high acceptability subgroup was higher for respondents who viewed 2, 3, or 4 hours of television per day. Model 1 correctly predicted 81.4% of cases, but it correctly predicted 0.0% of membership in the smaller subgroup (i.e., it did not correctly predict who would find the risk level unacceptable).

The expanded model, which included media use and personal traits, provided the best fit to the data (Hosmer – Lemeshow test significance 0.834 vs. 0.608). Model 1 and 2 predicted a similar proportion of cases correctly (81.4% vs. 82.8), but model 2 correctly predicted more of the low acceptability of risk respondents (13.7% vs. 0.0%). With personal traits added, exposure to television was no longer a predictor

Table 5.2. Binomial logistic regression analysis of acceptability of risks presented by black bears, calculated from responses to a 2002 mail survey in New York State (n = 959).

	Media-only Model			Media & personal traits model			Main effects & interactions model		
Variable	**B**	**Exp(B)**	**Wald**	**B**	**Exp(B)**	**Wald**	**B**	**Exp(B)**	**Wald**
TV viewing time			10.622			3.351			3.355
TV viewing time(1)	-0.789	0.454	2.548	-0.248	0.781	0.198	-0.245	0.783	0.194
TV viewing time(2)	-0.755 [b]	0.470	7.084	-0.001	0.999	0.000	0.001	1.001	0.000
TV viewing time(3)	-0.626 [a]	0.535	6.217	-0.185	0.831	0.435	-0.182	0.834	0.420
TV viewing time(4)	-0.816 [b]	0.442	8.168	-0.459	0.632	2.195	-0.459	0.632	2.195
TV viewing time(5)	-0.560	0.571	3.254	-0.302	0.740	0.794	-0.300	0.741	0.785
Newspaper reading			14.167			4.389			4.405
Newspaper reading(1)	0.754		12.790	0.360	1.433	2.416	0.361	1.435	2.438
Newspaper reading(2)	0.587		8.308	-0.082	0.921	0.122	-0.080	0.923	0.117
Gender				-0.454 [a]	0.635	5.565	-0.454 [a]	0.635	5.565
Hunting				0.586 [a]	1.797	4.241	0.643	1.902	2.935
Hiking				0.456 [a]	1.578	5.612	0.456 [a]	1.578	5.598
Benefits orientation				0.874 [c]	2.397	26.877	0.879 [c]	2.409	26.767
Have lived in an area with bears				0.598 [b]	1.818	8.330	0.701	2.015	2.083
Bear threatened pets				-1.928 [b]	.145	7.291	-1.928 [b]	0.145	7.259
Knew someone who's pet was threatened				-1.297 [c]	.273	12.412	-1.301 [c]	0.272	2.438
Hunting by lived in an area with bears							-0.125	0.882	0.055

Table 5.2. Continued.

	Media-only Model			Media & personal traits model			Main effects & interactions model		
Variable	**B**	**Exp(B)**	**Wald**	**B**	**Exp(B)**	**Wald**	**B**	**Exp(B)**	**Wald**
Constant	-1.316		30.384	-.549		0.371	-0.597		0.416
Model chi square	25.409[c]			120.65 [c]			120.71 [c]		
Model degrees of freedom	7			14			15		
-2 log likelihood	915.70			792.66			792.60		
Pseudo R^2 (%)	4.1			19.2			19.2		
Correctly classified (%)	81.4			82.8			82.8		
N	981			964			964		
H-L Test significance	0.608			0.834			0.850		

[a] $p < .05$ [b] $p < .01$ [c] $p < .001$

variable. Gender, hunting participation, hiking, wildlife benefits orientation, living in an area occupied by bears, experiencing a bear-related threat to a pet, and knowing someone who had a pet threatened were all predictor variables. The odds of being in the low hazard acceptability subgroup were greater among females, nonhunters, nonhikers, those with a low wildlife benefits orientation, those who had not lived in an area occupied by bears, and those who had experienced a threat to pets.

Model 3, which investigated interactions between all significant variables in model 1and 2, did not provide a better fit to the data than model 2 (Hosmer - Lemeshow test significance 0.850 vs. 0.834) and it correctly predicted a similar proportion of cases overall (82.8% vs. 82.8%), specifically in the low acceptability subgroup (14.8% vs. 13.7%).

Influences on concern and behavioral intention. Poor explanatory power associated with the risk perception measure in the 2002 survey led researchers to seek out an alternative approach to explore relationships between media use, concern about bear-related threats, and behavioral intention. Structural equation modeling (SEM) (Hoyle 1995, Kaplan 2000) offered an attractive alternative. SEM is a confirmatory approach that enables the researcher to test assumptions in an a priori model. In 2008, Siemer et al. (in review) used structural equation modeling to test hypotheses about media use and stakeholder perceptions and behavioral predispositions.

This analysis tested hypothesized relationships in the social amplification of risk framework (SARF). SARF posits that media reports about events or interactions can produce social amplification of risk perception, which in turn can heighten public concern and precipitate change in behavioral intention and behavior. Other research suggests that concern and behavior should be mediated by personal frame of reference, personal attributes, and personal experience. The SARF framework allows for consideration of such influences in models of risk perception antecedents.

The instrument for the 2002 mail survey was designed to include measures of key variables in the SARF model. A structural equation model (SEM) was constructed using data from that survey. Exogenous variables in the model included: age, gender, education level, hunting, seeing bears, and negative experience with bears. Antecedent endogenous variables in the model included: wildlife value orientation scales (i.e., wildlife use orientation, wildlife benefits orientation, wildlife protection orientation), television viewing, and print media exposure. Consequent endogenous variables included concern about bear-related human safety threats and bear sensitivity (measured using the bear sensitivity index developed by Peyton et al. 2000 and revised for use in New York (Siemer and Decker 2003)). Sensitivity to human-bear interactions was measured using a seven item bear sensitivity index (BSI). For the purposes of modeling, responses to items in the BSI scale provide a measure of behavioral predisposition to contact authorities for field intervention during a human-bear interaction. The BSI was originally developed as a measure of wildlife problem tolerance or social carrying capacity (Peyton et al. 2000).

Figure 5.2 provides a visual representation of the standardized solution for the final model presented by Siemer et al. (in review). Significant links between exogenous control variables and value orientation indexes have been removed for clarity of presentation. All other direct links in the model are shown (all coefficients reported in Figure 5.2 are significant at the 0.05 level). All direct and indirect links in the model are reported in Tables 5.3 and 5.4. All indices of model fit indicated that the final model was a good fit to the data (the fit indices were: $\chi^2 = 51.22$, df = 39, p-value = 0.09, $\chi^2/df = 1.13$, RMSEA = 0.019, 90% confidence interval of RMSEA (0.0;0.031), CFI = 1.00)

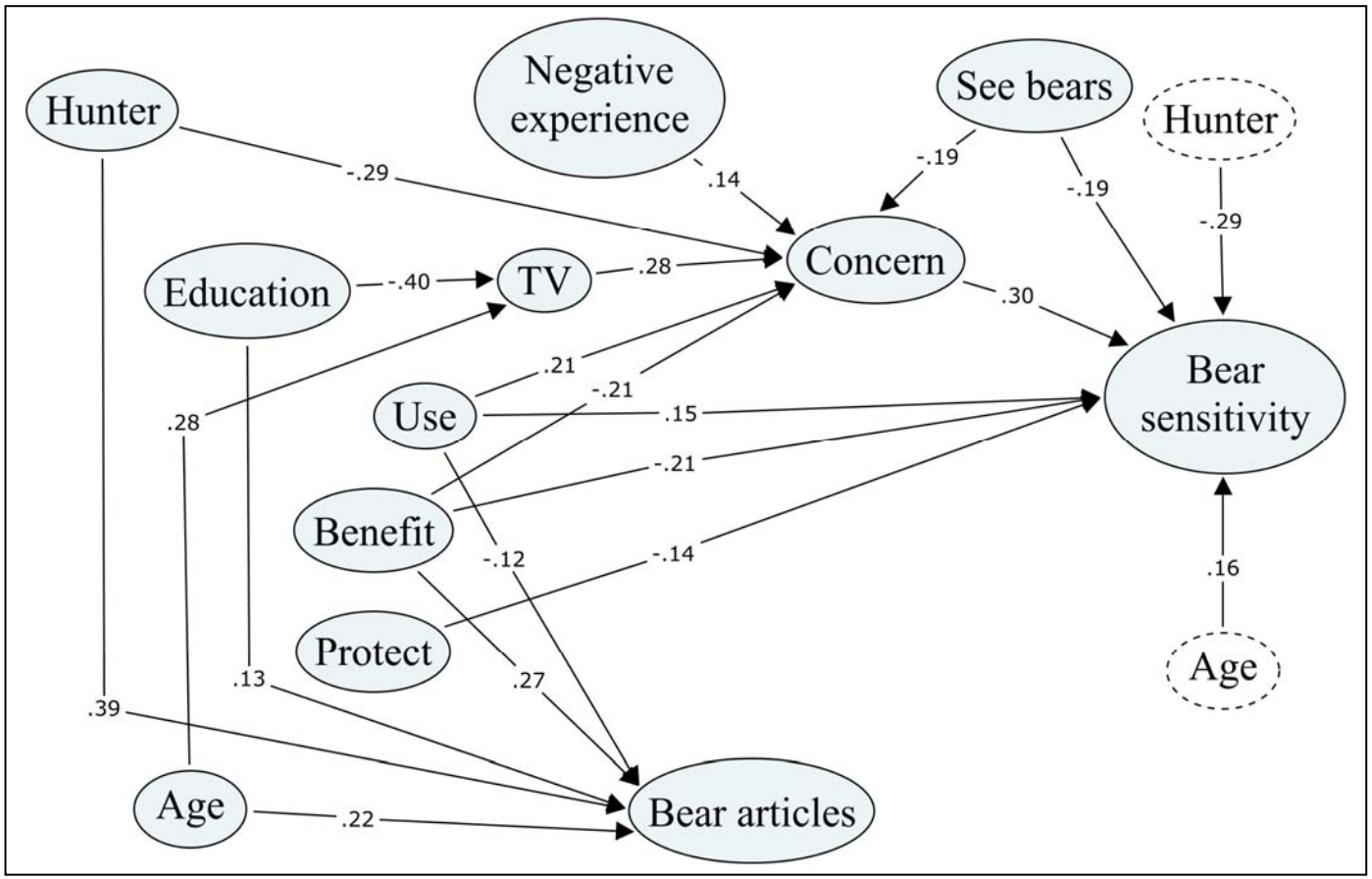


Figure 5.2. Standardized solution for final model of direct predictors of concern about and sensitivity to problem interactions with black bears in New York State (2002 data).

Table 5.3. Impact of exogenous variables on endogenous variables.

Variables	Gamma matrix[13]						
	Hunter	Age	Gender	Education	Years Lived with Bears	Seeing Bears	Neg. experience with Bears
Benefit	-	-0.16	0.11	-	0.15	0.29	-0.07
	-	-	-	-	-	-	-
	-	-0.16	0.11	-	0.15	0.29	-0.07
Protect	-0.59	-	-	-0.21	0.16	-	-0.12
	-	-	-	-	-	-	-
	-0.59	-	-	-0.21	0.16	-	-0.12
Use	0.55	-	-	-	-0.12	-	-
	-	-	-	-	-	-	-
	0.55	-	-	-	-0.12	-	-
Newspaper	0.39	0.22	-	0.13	-	-	-
use	-0.07	-0.04	0.03	-	0.06	0.08	-0.02
	0.32	0.18	0.03	0.13	0.06	0.08	-0.02
Television	-	0.28	-	-0.40	-	-	-
use	-	0.00	-	-	-	-	-
	-	0.28	-	-0.40	-	-	-
Concern	-0.29	-	-	-	-	-0.19	0.14
	0.12	0.11	-0.02	-0.11	-0.06	-0.06	0.01
	-0.17	0.11	-0.02	-0.11	-0.06	-0.25	0.15
Bear sensitivity	-0.29	0.16	-	-	-	-0.19	-
Index (BSI)	0.11	0.07	-0.03	-	-0.09	-0.14	0.08
	-0.18	0.23	-0.03	-	-0.09	-0.33	0.08

[13] Direct effects (row 1), indirect effects (row 2), total effects (row 3); all coefficients shown are standardized and significant at the 0.05 level.

Table 5.4. Impact of endogenous variables on endogenous variables.

	Beta matrix[14]						
Variables	1	2	3	4	5	6	7
1. Benefit	-	-	-	-	-	-	-
orientation	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
2. Protect	-	-	-	-	-	-	-
orientation	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
3. Use	-	-	-	-	-	-	-
orientation	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
4. Newspaper	0.27	-	-0.12	-	-	-	-
use	0.00	-	-	-	-	-	-
	0.27	-	-0.12	-	-	-	-
5. Television	-	-	-	-	-	-	-
use	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
6. Concern	-0.21	-	0.21	-	0.28	-	-
	0.00	-	-	-	-	-	-
	-0.21	-	0.21	-	0.28	-	-
7. Bear	-0.21	-0.14	0.15	-	-	0.30	-
Sensitivity	-0.06	-	0.06	-	0.09	-	-
index (BSI)	-0.27	-0.14	0.21	-	0.09	0.30	-

[14] Direct effects (row 1), indirect effects (row 2), total effects (row 3); all coefficients shown are standardized and significant at the 0.05 level.

The SEM model developed from the theoretical framework described by Siemer et al. (in review) supported most hypothesized linkages. Television viewing, wildlife use orientation, and age had a positive direct effect on concern about bears. Wildlife benefit orientation, participation in hunting, and seeing bears or sign of bears had a negative direct effect on concern about bears. As expected, the influence of several endogenous variables on bear sensitivity was mediated by concern about heath and safety threats associated with black bears. Several endogenous variables also had direct effects on bear sensitivity. Wildlife use orientation had a direct positive effect on bear sensitivity. Wildlife benefit orientation, wildlife protection orientation, seeing bears, and participating in hunting all had a negative direct effect on bear sensitivity (Figure 5.2).

The SEM model developed from the theoretical framework described by Siemer et al. (in review) did not support hypothesized linkages between print media use and consequent endogenous variables. Print media use had no direct or indirect effect on concern about bear-related human safety threats, or sensitivity to interactions with bears. Linkages shown on Figure 5.2 indicate that age, education, wildlife benefit orientation, and participation in hunting had a positive direct effect on use of print media articles about bears and other wildlife. Wildlife use orientation had a negative direct effect on print media use.

Implications within an AIM approach. The first two facets of media research in this case addressed immediate information needs. The final facet of media research addressed long-term information needs within the AIM sponsor agency. At an applied level, it addresses the sponsor's interest in understanding drivers of public concern about black bears and calls to agencies for intervention. Concern about problem interactions was identified by the sponsor as an impact worthy of management attention (Siemer and Decker 2006). Findings from this analysis yield multiple insights which address that long-term information need.

On an academic level, this line of inquiry addressed a broader interest in contributing to theory about how wildlife management stakeholders process and act upon risk signals. Findings from this inquiry make an incremental contribution to that larger effort. For example, development of a theoretically-based SEM model provided insights about the relative contribution of personal experience and value orientation (a measure of one's individual frame of reference) to concern and behavioral intention. Though academic in nature, these findings may lead to management applications in a range of issues where wildlife-human interaction are an emerging issue.

Catalysts and impediments to media monitoring and media relations

I relied on participant observations and analysis of transcripts from practitioner interviews to identify factors that catalyzed or impeded implementation of media monitoring and media relations in this case. Catalysts and impediments are summarized in Table 5.5 and 5.6. Findings are organized under headings that parallel those used to report catalysts and impediments in chapter 4.

Attributes of media monitoring

Media monitoring was regarded favorably by practitioners, and interest in the benefits of media monitoring likely motivated AIM practitioners to support media monitoring as part of AIM implementation. Yet, practitioners also recognized that they cannot control messages communicated through mass media channels, and may be able to do little to counter-balance messages from the media. That perception gave some practitioners a healthy skepticism about their ability to transmit agency messages through mass media reports. Pessimism about ability to control messages transmitted through media could dampen interest in media monitoring within an AIM sponsor agency.

> My impression from dealing with the media is that they look for certain key things with respect to issues. You can spend 45 minutes talking to a reporter about impacts of bears, they're still going to include all the little bear cub stories that they want. I think that the message out from us is not necessarily in need of much

improvement. I think how that message is perceived and how well the people who are writing for the media receive it and run with it is a whole different thing that we can't control. [R07]

Table 5.5. Catalysts to adoption and continued implementation of mass media monitoring and media relations by the Bureau of Wildlife, NYSDEC.

Attributes of media monitoring

- Relative advantage: AIM practitioners are drawn to quantitative media message analysis because it can help them understand public risk perceptions and concerns about bears (i.e., it helps them understand psychological impacts).
- Relative advantage: AIM practitioners are drawn to quantitative media message analysis because it can help them identify what messages they want to communicate to stakeholders via mass media.
- Compatibility: Practice of quantitative media research is consistent with the value practitioners place on having high quality information upon which to base media relations.

Attributes of sponsor agency (organizational culture and structure)

- Structural elements that would catalyze quantitative media analysis include:
  - resources for skilled support to teams (recognizing that staff need such support, and then providing mechanisms for that support).
  - internal staff to implement communication, outreach (i.e., regional citizen participation specialists, central office media specialists).
  - a designated communications liaison between management teams, researchers, other functional units within the sponsor agency, and the public.
  - supervisory staff who provide approval for their staff to serve on teams that gather information to inform communication strategies or design of media relations work (i.e., approval for that time allocation).
  - availability of immersion training (i.e., workshops in a setting that separates staff from daily responsibilities) that enable staff to spend time thinking about AIM concepts (including media-related aspects of situation analysis) before they implement an AIM approach.
  - AIM training specifically for Public Affairs office specialists would facilitate media relations and stakeholder communication by those staff for teams who approach that office for assistance.

Attributes of AIM practitioners

- Knowledge of basic media relations practices
- Knowledge of organization practices and procedures within sponsor organization
- Good working relationship between practitioner and media relations specialist.

Table 5.6. Impediments to adoption and continued implementation of mass media monitoring and media relations by the Bureau of Wildlife, NYSDEC.

Attributes of media monitoring

- Uncertainty: Practitioner recognition that they cannot control messages communicated through mass media channels creates reluctance to invest in media analysis.

Attributes of sponsor agency (organizational culture and structure)

- Structure of sponsor agency creates challenges for communication and coordinated media relations by regional offices and Public Affairs Office (e.g., things get held up in "the system" while waiting for approval and communication actions are delayed or may never happen at all).
- Structure of sponsor agency puts a premium on staff reaction to immediate day-to-day problems. This fragments staff time, it does not allow staff enough time to focus on any one topic for very long; staff never have enough time to devote thoughtful work (e.g., strategic planning, communication campaigns).
- Structural limits on staff time make it difficult for regional staff to get access to communications specialists within the agency.
- Structural limitations on media relations work by regional staff.
- Organizational resistance to using new external communication channels, organization policies that prevent use of some tools (e.g., paid advertisements).
- Wildlife-related media relations may be a low priority within regulatory agencies with multiple responsibilities.
- Changes in state administrations can create uncertainty and/or a different level of institutional support for particular programs. An initiative like AIM could be impeded by an administration change, for reasons that do not relate to the strengths or limitations of the initiative.

Traits of staff

- Some staff may not regard communications or media relations a core part of their job responsibilities (i.e., "I was trained as a biologist, not a communications specialist").
- Staff lack training they need to make a contribution on questions of media relations and external communications.

Attributes of sponsor organization

Experiences in this case suggest that the most important catalysts for media research within an AIM application are creating an organizational structure and culture that supports media relations efforts. Structural support includes providing financial

support, staff support, and staff training. Cultural support includes supervisory approval for staff time devoted to planning and information gathering that can inform media relations work by the sponsor agency.

Communication challenges associated with media relations by a specialized central office for public relations was repeatedly identified as an impediment to quick and effective media relations in local regions. Interaction between regional staff and central office [Public Affairs] impedes ability of regional staff to do even simple media relations.

> …we a lot of times provide messages that we want to get out and even suggest the means we'd like to see them get out, but they're – for some reason they – well they have to be approved … before we could do it ourselves. So not only is nobody from publications or Public Affairs, or whatever, picking up and doing it for us, but they are telling us that we can't do it either a lot of times, or just making it so it takes so much time that it never gets done effectively. Too many hindrances, and getting simple messages out … should be done a lot more widespread, I think, a lot larger volume to be effective. …Maybe there's some miscommunication that needs to be cleared up there or maybe getting together with – meetings with – between public affairs and the Bear Team leaders to help to clear up any miscommunication or help get some understanding across that these things are really keeping us from making progress – being effective. But I'm not sure how exactly to – we go about doing that. [R04]

This impediment can be overcome, but represents a significant challenge in state wildlife agencies. Seasoned professionals are aware of how to overcome those challenges. Training and experience for newer personnel are needed to increase staff capacity to participate in successful media relations activities.

> Well, it's hard within a government agency …we have to be equipped to respond to the media when it's appropriate or educate our Public Affairs people so that they can respond properly. So right now, a call comes into Albany about bears, I probably won't answer it … somebody from Public Affairs will, but they'll call us and ask us for the answers first. So, you know, we use that as an opportunity not only to answer their question but to give them some background information and try to broaden their knowledge of the subject. So it's a little awkward. We should

> be prepared and equipped to have consistent messages from bear team members that help, but it's difficult within a government agency to respond back to the media. There are times when they'll say [they meaning the Public Affairs Bureau] will say, you know, you have the green light to talk about bears, and once you've established enough of a working relationship with the Public Affairs system we had in place at that time [at the time of the bear-related human fatality], you know, they'd rather have you talking to the public about the bear than themselves.
>
> … within a state agency, the more you work with your public affairs people the better that relationship is – the better the trust and understanding and the easier it is to get out the messages. You know, the worst thing you can do is, speak out without involving the people responsible for these messages to the media and, you know, acting like a loose cannon or something like that. They'll definitely have to respond to that – and it will be in a very negative way. [R08]

Attributes of AIM practitioners

Practitioners in this case perceived that they had a role to play in media relations. Yet, interviews also revealed that AIM practitioners felt unprepared to take the lead on communication activities such as media relations. They believed media monitoring and media relations would only continue if AIM practitioners had access to specialists with media relations and communications expertise.

> You know, we have a Public Affairs department, but we're met with continual constraints and obstacles in using them to put out the message that we want. And obviously, we're all trained as biologists and not educators and not media people. So, it seems to me, we're constantly trying to craft a message that we're familiar with, into ways that the public understands. And it's just a constant battle, because we're not affective that way. We're working beyond the scope of our training and experience in that regard. [R09]

One suggestion to catalyze media relations as part of AIM implementation was to encourage practitioners to take a more active part in communication functions of their agency.

> I think the one thing you can convey to people is the importance of taking an <u>activist</u> part in it. I think a lot of people want to play biologist and leave communications to somebody else to deal with. [R06]

For these reasons, having access to staff who know more than biologists do about media relations and stakeholder involvement was identified as a key part of catalyzing media monitoring and media relations. Additional staff training was mentioned as a key to improvement in this area, as well. Training that liberates practitioners from their daily responsibilities and creates an immersion experience was noted as being a true catalyst toward adoption of AIM, including adoption of a media component within AIM.

> Well, you know honestly, I probably spent a year before I really understood impact management. And I think there were others [who felt the same way]. Probably going back to the sessions we had at Turkey Trot [a retreat setting where Bear Team members met with HD specialists during a 2-day continuous workshop]. I think that's when the lights really went off for me. You know, when I had the time to focus on that for a few hours and didn't have to worry if I was going to get snowed out on the way home, where we were in a location where we could actually delve into it and. … I think it was really something that helped me come to grips with the fact that we need to be putting out messages about impacts. [R07]

Part II: Project Outcomes

In Part II, I address my third case research question with respect to media research and media relations (i.e., are outcomes from this case consistent with the assumption that AIM implementation can improve agency performance?). The following subsections address case research question three by describing benefits that AIM practitioners believe their agency experienced as a result of media components included in AIM implementation.

Benefits of media research within AIM situational analysis

All the practitioners interviewed saw utility in the first two media research projects conducted as part of AIM situational analysis. Benefits perceived by practitioners fell into four broad categories: guidance for message development,

improved information quality, greater understanding of stakeholder perceptions, and improved agency performance.

Guidance for media relations

There was no dispute among AIM practitioners about the potential value of media relations within a wildlife management program. All believed that media relations were vital to program success. Having an agency capacity to get consistent and timely messages out to the public was highly valued among AIM practitioners. Those beliefs seemed to be rooted in what practitioners perceived as past media relations accomplishments. For example, one practitioner believed good media relations had influenced stakeholders to accept more personal responsibility for avoiding bear problems.

> …I think a lot of those [media relations] things had a big effect on public perceptions of bears. I've seen quite a big change just in the attitude of people who call [DEC]. Used to be, most everybody just wanted you to get the bear and get it out of there. They didn't really make the connection that they're attracting in a problem. But these days, I think a lot of them, a lot of people who call already know what they have to do and they're almost, they'll often tell you, "yeah, the bear got in my garbage—I know I'm not supposed to have it out," they just want you to know what happened. Not to have us [DEC] go do anything, but tell them to put their garbage away. So I have seen that change over the last 4-5 years. [R03]

Media analysis was regarded by AIM practitioners as a valuable input to media relations efforts within their agency, which are designed and implemented primarily by media relations specialists working from the DEC central office. Practitioners believed media analysis in this case helped them understand what messages DEC should strive to communicate to stakeholders (directly or through mass media).

> We may not know the issue, we may not know the message we want to send, and I think that between yourself and the other work, [the media message and risk

> perception analysis] why, it really helped me understand a lot of the messages we want to send out." [R07]

Members of the Bear Team believed they should be relied on to support their media relations specialists with regard to message development, audience targeting, and perhaps even preferred communication channels among target audiences for black bear management. They believed that insights obtained through media research could help them be more effective as informants to their media relations specialists. For example, one practitioner recognized that media research could help management teams understand how a DEC media relations response could broaden the range of impacts discussed by the media.

> …Like that [set of stories about the] bear with the jar on its head. … I think I only saw one picture of a bear in those stories, but it was still associated with dumpsters, you know, and people weren't picking up on the message that garbage being available to the bears and this bear is sticking his head down this jug is why the bear is suffering, you know? So that impact could have been brought out [in the media coverage] and it really wasn't. But by seeing what the media is doing, you know, a Bear Team member down there could have helped bring out that impact and maybe addressed it a little bit with public education. It was – we loose a lot of educational opportunities when these things hit the press. [R08]

Improved information quality

Many biologists do their own informal media analysis. Some practitioners see great utility in doing a rigorous media analysis. They regard it as a means to take what they normally do to a higher level, allowing them to gain a more objective sense of messages and risk signals being communicated by newspaper, radio, and television. All AIM practitioners had impressions of media bias based on past experience. Nevertheless, they recognized the value of using media research to challenge those assumptions in specific contexts.

> I think that essentially looking – you know, kind of categorizing or characterizing the types of media we got, I think that's all very important as well. Yeah, I think that that's all good, because I don't think that that ever gets looked at either. …It's awful easy to sit back and say – hey, the media never gets it right. But I think it's important to be able to look at that and say – hey, what is the media doing? …I thought that was very positive. [R02]

> As far as monitoring media or messages about wildlife, we have, inside here we have access to daily newspaper clippings, for example and, you know, that's the first thing I do each day is to read those. There's also Carnivore.com, where I can see on a national or international level what might be coming up, or how the public might be responding. … so you know, we get constant reminders on how the media addresses things and how they handle it… But we've become a lot more aware – in part because of some of that earlier stuff that you and [MG] did when you were actually looking and identifying each time the media covered something about black bears. So we kind of carried that on [what Cornell research team was doing] – we look for that …we pay for a [clipping] service and they photocopy all the stuff and it's part of my insight. … And Carnivore.com – that's just another one that some of the team members look at, you know, and things like that …gives a little better feeling on the pulse of what's going on. …You know, you live in your own little world, your one newspaper or something like that and you occasionally see an article, but these [articles about bears] are popping up all the time … probably every other week one of our bears makes the news unfortunately, so that's very important to us now." [R08]

Greater understanding of stakeholder perceptions

Some practitioners believed that media analysis was beneficial for their agency because it leads to understanding of stakeholder perceptions. For example, some practitioners believed media research clarifies how willing publics are to accept wildlife-related risks, yielding insights that will help their agency respond in ways consistent with public expectations. Some characterized this function of media research as helping their agency get "a better feeling on the pulse" of a wildlife-related public issue.

> I think it [media research] is very useful. I mean, I tend to look at things … as keeping a pulse on what the public's interest is on all kinds of wildlife topics … So to have that sort of analysis be part of the whole system, I think, is well played. [R06]

> …you know, [the] whole topic about risk of free-ranging wildlife to people, and how willing they are to accept that risk … from a public policy arena, it's a really fertile ground and one that the more information we have, the better poised we are when crises break. [R06]

Media analysis can help a team understand and anticipate the questions about a wildlife management issue that are under discussion in the public arena. Having that information can help managers prepare responses to those questions that are consistent across the state.

> I think there's a real thirst for information from the public about wildlife moves or things we [DEC] might be proposing. They want to learn as much as they can about us [DEC]. They want to know if we are going to be a credible source. It's good to have a prepared response. It's very useful for everybody [in DEC] to be talking from the same page, same messages, is very useful. And it helps with efficiency, too, when you've got a recent [New York] Conservationist article that's responsive to the kinds of questions people are asking, to be able to point them to it, provide a reprint, and have whichever staff person is trying to field an inquiry, can come up with the same sort of information without starting from scratch. [R06]

Improved agency performance

Some practitioners believed that the media components of the AIM work were part of the package of activities that helped the Bear Team make, defend, and get approval of regulatory change recommendations.

Summary, discussion and conclusions

This case provided evidence that quantitative media monitoring, conducted as part of AIM situational analysis, can produce benefits for state wildlife agencies.

AIM practitioners readily accepted suggestions to incorporate media monitoring as part of AIM situational analysis. Adoption of media monitoring was easy to attain because the activity was consistent with practitioners interests and professional values. AIM practitioners were already doing informal media monitoring and they appreciated having access to quantitative monitoring. These findings lead to

the conclusion that it will not be difficult to convince other wildlife professionals to incorporate media elements in AIM implementation if funding and technical expertise are available.

Resources to pay for media research, access to expertise on media monitoring and media relations, training for practitioners, and management support for communications activities generally, will likely determine whether a sponsor agency can initiate or continue media monitoring as part of an AIM approach. These are substantial, but relatively simple challenges to overcome.

Organizational culture and structure within wildlife agencies present a more complex and difficult set of impediments to media monitoring within an AIM implementation. Though multiple communication needs are recognized within wildlife agencies, staff composition, staff training, and staff work assignments continue to leave wildlife agencies with very limited capacity to conduct communication with stakeholders (either individually, or collectively through mass communication). Agency structure and staffing decisions impede any effort to expand communications capacity. Most practicing wildlife managers have limited training related to communication arts and sciences; predictably, those staff resist taking on communications responsibilities that they were not hired or trained to address. In a rapidly changing society, *wildlife agencies have not adapted their organizational structure enough to keep pace with increased needs for communications capacity*. Those shortcomings manifest as inefficiencies and ineffectiveness in stakeholder engagement and media relations. Studies indicate that communication functions are a consistently weak aspect of agency image. To successfully implement AIM, that long-standing structural challenge must be addressed. The implications of these findings for advancing a practice of AIM are discussed at length in the closing chapter (chapter 7).

CHAPTER SIX

USING SYSTEMS MODELS TO SUPPORT IMPACT MANAGEMENT

Introduction

One of the conceptual innovations represented by AIM is its emphasis on using systems thinking and systems models to inform impacts management decisions. The purpose of this chapter is to present case research observations and insights related to systems thinking and systems modeling in support of AIM for black bear management in New York.

I drew on participant observations, survey data, and AIM practitioner interviews[15] to conduct this aspect of the case study (detailed description of methods appears in chapter 3). The overall case study had three embedded units of analysis. This chapter focuses on one of those units (i.e., wildlife managers).

Riley et al. (2003) suggest that systems thinking and modeling can be used to inform selection of enabling objectives and related management actions. Later in an AIM cycle, Riley et al. suggest that findings from monitoring efforts and/or active management experiments should be utilized as feedback to inform revisions of systems models and management actions as necessary (i.e., active experimentation or passive monitoring should produce learning that enables wildlife agencies to practice adaptive management). Thus, in addition to discussing systems thinking and systems modeling, this chapter also touches on portions of an AIM cycle that follow systems thinking in Figure 2.1, including selecting and implementing actions, as well as evaluating or monitoring outcomes produced by management actions.

Case study findings are reported in two parts. Part I focuses on the range of activities within loop 2 of Figure 2.3. It documents how practitioners adopted the idea

[15] Supporting quotes provided in the body of the text are illustrative rather than comprehensive. Full interview transcripts and analysis files are available and may be obtained by contacting the author.

of using systems-oriented management models and how they implemented that idea as part of an informed transactional approach to black bear management. In part II, I present findings related to outcomes of a group-model-building exercise with AIM practitioners. I end the chapter with a synthesis of conclusions related to case research questions 1-3 as those questions relate to the topic of systems thinking in management.

Part I: Adoption and Implementation

In 2004, I began working with a system dynamicist to complete a group model building (GMB) project with members of the Bear Team. The GMB project had two research objectives: improve understanding of (1) why complaints about residential problems with black bears were increasing in New York; and 2) how managers might best intervene to control those problems. Four outcomes were desired from the project: (1) understanding of the system generating impacts; (2) consensus about the problem definition; (3) commitment to management actions; and (4) simulations for use in issue education. Understanding, consensus, commitment, and simulations were products that the project facilitators led the participants to expect, based on their understanding of GMB literature.

The Bear Team regarded this work as a pilot project and a learning experience. In addition to achieving the research objectives stated above, the Team agreed to utilize the experience to pilot test group model building as part of an AIM process, and as a tool to support decision recommendations by NYSDEC management teams. It was understood that additional agency investments in quantitative group modeling would be predicated on the utility this pilot project had to AIM practitioners and senior leadership in DEC. The following sections describe the initiation and implementation stages of the GMB project.

Systems modeling initiation stage and adoption decision

The decision to pilot test quantitative modeling as part of AIM implementation was preceded by a lengthy initiation stage. A Post-Doctoral Associate with HDRU (Riley) provided consultation to BOW staff over a period of months beginning in 2000. During that time, he exposed staff to a number of innovative ideas, including ideas about concepts and principles of management in general, focusing wildlife management on impacts, and integrating systems thinking and use of systems models into wildlife management. That body of work included a 3-day retreat ("Adaptive Impact Management (AIM) of Black bears in New York: A retreat to initiate formulation of decision support models," March 20-22, 2001 in Candor, New York) convened by HDRU and delivered to leaders within BOW and practicing managers with responsibilities for bear management. The purpose of the retreat was to discuss systems thinking and systems modeling using STELLA software, and to illustrate how systems modeling might be useful in the context of an AIM approach to black bear management. That work served to create awareness and consideration of systems modeling to support decision making within an AIM approach to black bear management.

During the workshop, Bear Team members were exposed to the idea that they might develop systems models where a particular impact or set of impacts became the objective function. It was explained that such models would help managers better understand what actions they could take to increase or decrease the level of a particular impact. Exercises during the retreat focused on several variables that were later explored through the GMB project, including risk perception, media use, concerns about bear-related problems, and food conditioning of bears. BOW leadership made a decision to support a quantitative modeling project focused on black bear management in 2003.

Implementation of the group-model building (GMB) project

Richardson and Pugh (1981) define seven stages in building a system dynamics model: problem identification and definition, system conceptualization, model formulation, analysis of model behavior, model evaluation, policy analysis, and model use or implementation. Several methods of completing these stages in a group model building intervention are described in the system dynamics (SD) literature (cf. Richardson and Pugh 1981; Roberts et al. 1983; Vennix 1994). I collaborated with a system dynamicist (Peter Otto) to employ the "standard method" (Hines 2001) for this project. The GMB project included a set of on-line activities (i.e., 4 facilitated workshops with the project team, using facilitated small group exercises called "scripts" [Andersen and Richardson 1998]) and off-line activities (i.e., the modeling team met many times and worked independently on model development), completed over an 18-month period (February 2004 – July 2005) (Figure 6.1). Collectively, the project addressed all seven systems thinking skills proposed by Richmond (2001) (Table 6.1). Description of model sectors, dynamic hypotheses, and techniques the facilitators used to implement the model-building process can be found in Siemer and Otto (2005a).

Feedback loop to inform professional and lay understanding

Loop 2 of Figure 2.3 indicates that, in an ideal AIM application, practitioners working in interdisciplinary teams will use systems thinking and systems models to actively synthesize professional opinion about how to manage a public issue. Those interdisciplinary teams will then take actions to inform professional opinion on that wildlife issue by providing feedback to professional and lay audiences. Completing that feedback loop is conceptualized as a means to promote learning and effective management of impacts. In this case, feedback to inform professional and lay opinion took form as a series of professional presentations (Beall et al. 2006, Siemer and Otto

2005a, Otto and Siemer 2006, Siemer et al. 2006a, Siemer and Decker 2008), publications on the modeling process (Siemer and Otto 2005b, Otto and Siemer in review) and issue education (Siemer et al. 2007c), and use of the bear management simulation for professional and lay audience issue education workshops (Siemer et al. 2006b).

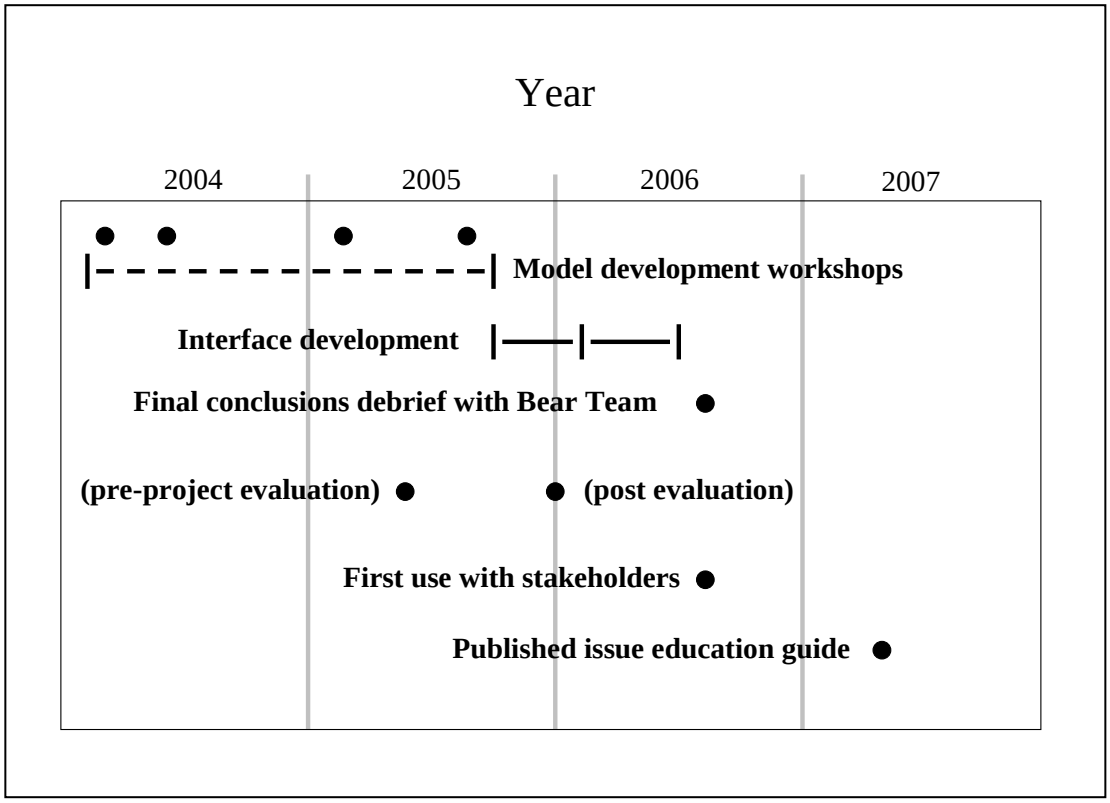


Figure 6.1. Timeline of activities and products for group model-building (GMB) project with Bear Team, 2004-2007.

Table 6.1. Connections between the systems thinking method, system thinking skills, and the group model building intervention with wildlife managers in New York, 2004 – 2006.

Steps in the systems thinking method	**Systems thinking skills** (source: Richmond 2000)	**Group model building (GMB) activities**
Specify problem/ issue	1. **Dynamic thinking:** framing a problem in terms of a pattern of behavior over time. 2. **System-as-cause thinking:** Seeing internal actors who manage the policies and physical components of the system as responsible for behavior. 3. **Forest thinking:** Seeing beyond the details to the context of relationships in which they are imbedded.	• GMB workshop 1 and 2: • Development of problem statement, dynamic hypotheses
Construct hypotheses (or model)	4. **Operational thinking:** Understanding how a behavior is actually generated. 5. **Closed- loop thinking:** Viewing causality as an ongoing process, not a one-time event, with effects feeding back to influence causes, and causes influencing each other. 6. **Quantitative thinking:** Knowing how to quantify, though you can't always measure.	• GMB workshop 3-4, model construction • Development of causal loop diagram • Development of stock-flow model
Test hypotheses (or model) Implement changes	7. **Scientific thinking:** Knowing how to define testable hypotheses.	• Development and use of policy simulation interface • Policy simulations bolstered current staff beliefs; no policy changes were made
Communicate understanding	Encouraging wildlife professionals and management stakeholders to develop systems thinking skills 1-5	• Stakeholder workshops (e.g., Woodstock meeting) • Presentations to professionals, peer-reviewed publications

GMB project outputs

We worked with participants to articulate and integrate dynamic hypotheses about the problem system as a causal loop diagram (CLD). The CLD served to articulate participants' understanding of the complex interactions occurring between community residents, wildlife agencies, hunters, and black bears (Figure 6.2). The GMB process culminated in completion of a quantitative stock and flow model[16] (Sterman 2000). The final model contained over 200 variables (including 16 stocks) and six model sectors, which we labeled: bear population, hunters, food, bear-human interactions, knowledge/interest, and agency resources. Exercising the quantitative model enables operators to explore how changes in (1) hunting opportunity (i.e., amount of land open to hunting, season dates, season length), (2) agency effort devoted to prevention education (i.e., agency resources expended on information/education actions), and (3) agency staff capacity to respond to bear-related problems (with on-site technical assistance to residents) influence the frequency and severity of human-bear interactions in residential areas.

One of the desired products of the GMB project was a simulation (or set of simulations) that wildlife managers could use for communication with management stakeholders. That goal was attained (use of the quantitative model to create bear management policy simulations is reported in Otto and Siemer in review). However, we also discovered that the managers had difficulty using the original modeling software and interpreting simulation results when the facilitators ran the software.

[16] Detailed information on the development of stock and flow models is available in Sterman's (2000) widely-used text on simulation modeling. Sterman (2000:191) identifies stocks and flows as "the two central concepts of dynamic systems theory." Stocks are accumulations of things, both observable (e.g., bears, bear-related complaints) and latent (e.g., concern about bears). Stocks are controlled by inflows and outflows over time. All quantitative modeling applications (e.g., Vensim, STELLA) utilize these basic building blocks to allow users to simulate dynamic feedback in systems.

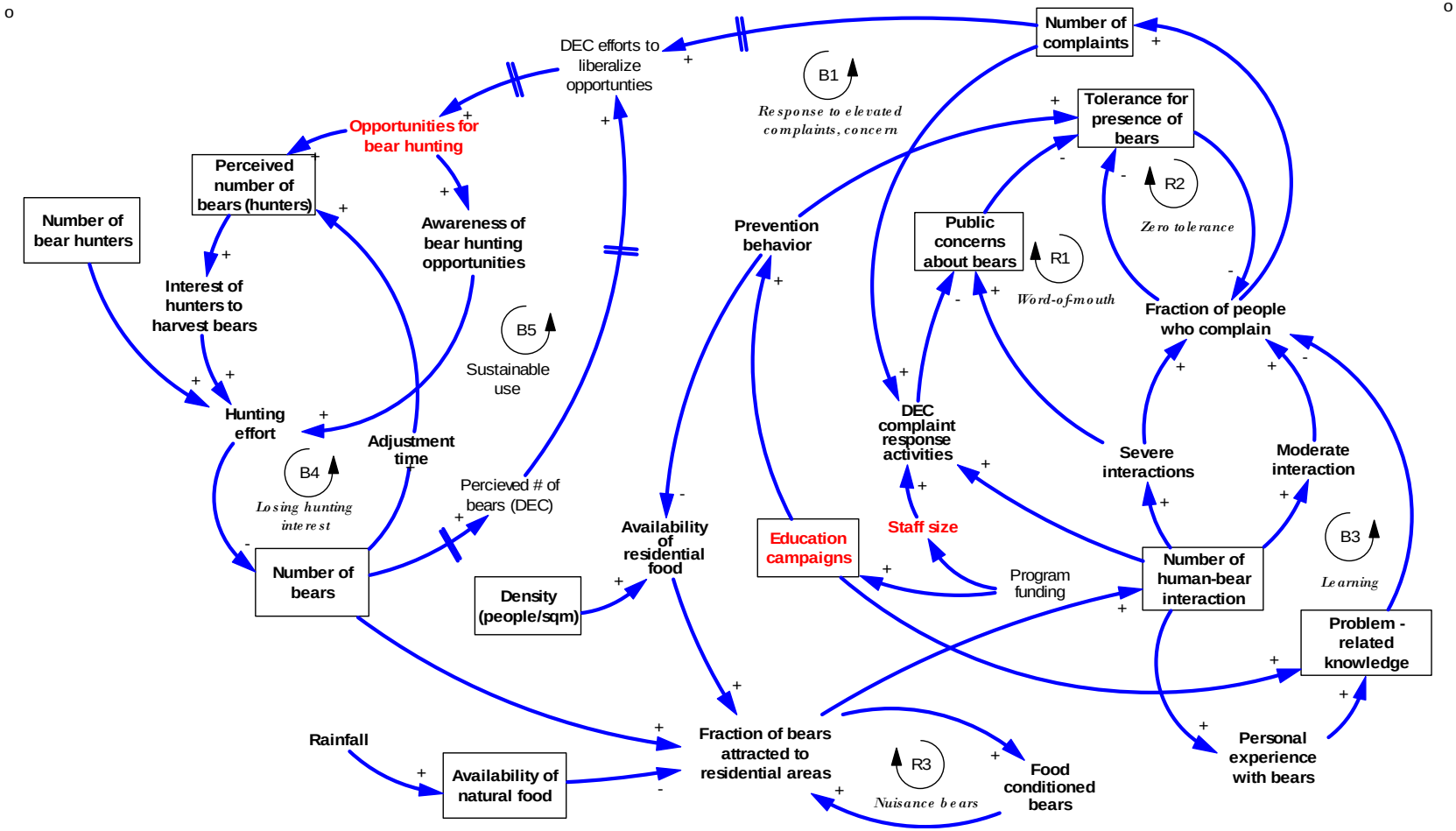


Figure 6.2. Causal loop diagram developed with the black bear project team.

Thus, we continued beyond our original project to work with the modeling team to design a simple interface they could use to produce management simulation runs. We completed the model interface between fall 2005 and summer 2006, using an iterative process of design and interactive sessions with a 3-member subgroup of the modeling team, followed by an interface pilot test with a regional audience of wildlife management professionals. The simulation interface was published in 2007 as part of a practitioners' guide on black bear management issue education (Siemer et al. 2007c). Though the simulation was published for potential use by any state wildlife agency in the northeastern United States, it provides a particularly useful tool for managers and stakeholders in New York to discuss bear management actions.

Catalysts to systems modeling

A small set of factors catalyzed quantitative modeling in this case. BOW leadership made a decision to support the modeling project in part because the HD research team was able to bring in matching funds to support the work. Matching funds were provided by the Cornell University Agricultural Experiment Station and the Cornell System Dynamics Network (CSDNet). Several system dynamics professionals contributed time and expertise to the project at no cost. Quantitative modeling in this case was catalyzed by intervention of HD specialists with an unique opportunity to obtain access to professionals with expertise in system dynamics and facilitating group model building exercises.

Impediments to systems modeling

Several attributes of the modeling process, BOW as an organization, and AIM practitioners emerged as challenges to overcome during implementation of the GMB project. Collectively, these challenges represent potential impediments to use of quantitative group modeling exercises by BOW or similar AIM sponsor organizations.

Attributes of modeling. Practitioners valued the learning generated during the model-building process, but most did not perceive any relative advantage in using the final products (i.e., the quantitative model and simulation interface) as a support tool to make decisions about bear management actions. Complexity and uncertainty seemed to be the most important factors driving those perceptions.

Systems modeling is inherently complex. Several AIM practitioners in this case deemed the GMB exercise as too complex to be used by practitioners for decision support.

> My initial gut feeling with this, Bill, is it was one of those training sessions that you go to, and it's nice to see that that kind of strategy, that planning, that model building exists. But I think it's way over the head of some of our folks to actually apply … in my case, it got a little bit more complicated with another "spaghetti line" going this way and that way. It's like, "how in God's name are we going to plug all this information in to come up with some type of answer. … to bring it back to the table to say this is how we are going to use it. I don't see it happening. [R10]

> I was putting my faith in [the modeling consultant] to get the complexity taken care of. It's like relying on a good mechanic to fix your car and make sure it works. …But again, the complexity of it can even kind of shut down our professional staff. You get in a room and you're looking at this stuff. If it is too complicated, then they [members of the Bear Team] probably tend to think that it is not going to help their problem. "It's too much, I can't deal with this," you know? We try to look at things from a meat and potatoes sort of way of doing things at times, you know? [R01]

In addition to complexity, uncertainty about model inputs was a major impediment to use of the final model as a decision making aid. Although they were cautioned against doing so, many practitioners seemed to evaluate the final product of the GMB project as a predictive tool. Given the uncertainty associated several model inputs, many practitioners remained skeptical of model outcomes that were not consistent with their expectations. Uncertainty about model inputs (and consequently,

model output) was a serious constraint on the potential use of the model as a decision support aid, in the minds of most practitioners.

> Yeah, I would say between this and the stakeholder process and so forth, that this one I have not made use of. So, its been the least useful to me [compared to impacts work and media work]. I think from the very beginning, you mentioned those half day meetings [modeling workshops], I was just really trying to grasp what exactly we were getting at and how this was going to become useful to us. But after we had seen the model and having it in my hand, I started to question the inputs, and how much confidence we had in the inputs that were driving this thing. And I didn't know that I had a lot of confidence in some of those inputs ….with those couple of weak links in there, I never had a lot of confidence in it. Ran it only a few times out of my own curiosity. [R01]

Attributes of sponsor organization. At some point in nearly every interview, practitioners mentioned that they spend most of their time responding to immediate, local problems (e.g., they spoke of being in crisis mode, being forced to operate in a reactive mode, "putting out fires," or moving on to the next "brush fire"). The strategic and long-term orientation of system models are at odds with organizational culture of wildlife agencies, which place a premium on staff response to local, immediate problems of the day. The organizational structure and culture of wildlife agencies does not cultivate or reward strategic thinking by regional staff.

> Um, you know, I would probably use it [the model] myself for decision making, only because I know what went into making it. Although, it is a long-term thing, too. Most of the stuff we do [in DEC] is based on immediate results. And to look down the road seven or ten years or whatever, it is good to do that. But just the way our agency is, the way we are organized and the way we are set up, there's not many people do that, that look that far down the road. It's more of, "what can I do right now?" to make it better next week, or even next year, but more than that is not a common thing. [R03]

Attributes of AIM practitioners. Prior to the exercise, practitioners had no formal training in quantitative modeling or use of the modeling software. They had no capacity to conduct modeling activities independently or to operate or maintain

existing models in the absence of a modeling consultant. Quantitative model building, like any analytic discipline, requires practitioners to develop technical skill sets. Practitioners in this case had no responsibilities for model construction, but were expected to have a working knowledge of software icons and an understanding of how group discussions and data were translated into model structure. Several noted that even those modest skills quickly degrade unless maintained through training and daily use. Practitioners noted they needed retraining after long breaks between modeling workshops.

> So, I have that concern as well as the fact that it's fairly specialized, sophisticated software that probably, again just in my perspective, that if you and [the SD modeling specialist] didn't sit in with your hand on the switch, it wouldn't take too long before the recollection that it was available as a tool or the expertise to run it and understand what was going on, would kind of disappear. [R06]

> I haven't seen a lot of our folks use that modeling information and anytime we go back to that model it's like you almost have to go back to square one in order to get back up to the final stage of it, and then you understand it, and then if you don't do something with it right away, it's lost and you have to start the whole process of going back to the beginning and working your way back up. …It went beyond the "keep it simple" adage. …I just don't see the regional guys, in the work that they are doing, go back to that model, you know. But to go back to the SIGs and the AIM, I think, they could work on that without any problem, but, not gonna go anywhere with the model. [R10]

Wildlife managers also operate in a management environment that acculturates a risk-adverse approach to dealing with stakeholders. Expecting public challenges, many practitioners are reluctant to go to the public until they feel confident that they can offer defensible responses if their programs are scrutinized. That risk aversive stance was reflected in a reluctance to use the final model simulation as a public issue education tool. Most practitioners said they were uncomfortable using simulations to talk with stakeholders because they believe simulations raise questions and doubts

about a management program that cannot be resolved. Some viewed the simulation created in this case as a kind of black box that they did not feel comfortable explaining to stakeholders.

> It strikes me as kind of a black box sort of a thing that I have a concern that folks that weren't involved in the development of it may put to much stock into, "OK, we'll set these initial parameters, let something run behind the curtains, and here's the answer that comes out at the end, without understanding, you know, all of the things that went into it and which may be more repeatable than others and some kind of that kind of thing. [R06]

> …and the other aspect of it is, if the departments' credibility is really being questioned … if somebody says, well I don't believe you, [then using the walking them through the model doesn't help because it contains too much uncertainty]. [R09]

Part II: GMB Project Context, Mechanisms and Outcomes

I used a mix of qualitative and quantitative techniques to evaluate the extent to which the GMB project created a context and mechanism for persuasive communication within the Bear Team. I then evaluated belief change, attitude change, and other outcomes associated with the project (for details about this analysis, refer to chapter 3).

Project Context

Motivation to process information

Project participants decided to focus on understanding how to manage an increase in negative human-bear interactions in residential areas of New York State. The pre-modeling assessment documented that all participants believed this to be an important problem for the agency to address and that the agency would face serious consequences if the problem were not addressed (Tables 6.2 - 6.4). They characterized an increase in negative human-bear interactions and complaints about such problems as bad or very bad, and all believed negative interactions and bear-

problem complaints were likely to increase during the next five years (Table 6.3). These results provide some evidence that the project focused on problems of management importance, theoretically problems that participants were motivated to solve.

Table 6.2. Items assessing whether the GMB project focused on a problem important to project participants.

The problem: An increase in negative human-bear interactions in residential areas.	Mean[17] Pre exposure	Mean[17] Post exposure
In my work I often deal with the consequences of this problem.	1.25	1.38
Managing this problem is important to me personally.	1.38	1.50
This is a problem that can have serious consequences for BOW if left unresolved.	1.36	1.38
It is important for BOW to focus attention on this problem.	1.38	1.38

[17] 1=Strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree.

Table 6.3. Items assessing evaluation of outcomes (a set of evaluative beliefs) that might be produced when black bears are present in residential areas.

	Good-bad (mean[18])		Likely-unlikely (mean[19])	
	Pre exposure	Post exposure	Pre exposure	Post exposure
An increase in the rate of negative human-bear interactions in residential areas	4.50	4.50	1.50	2.00
An increase in public concern about bear problems in residential areas	2.88	3.38	1.63	1.88
An increase in intolerance to bear problems in residential areas	3.88	4.00	1.88	2.50
An increase in complaints about bear problems in residential areas	3.88	3.88	1.63	2.00

Table 6.4. Items assessing perceived importance of reducing certain outcomes (a set of behavioral beliefs) that might be produced when black bears are present in residential areas.

	Mean[20]	
	Pre exposure	Post exposure
Reducing the frequency of negative human-bear interactions is…	4.38	4.00
Reducing concern about bear problems is…	4.00	3.88
Increasing tolerance for bear problems is…	3.38	3.50
Reducing complaints about bear problems is…	4.00	3.38

[18] 1=very good, 2=good, 3=neither good nor bad, 4=bad, 5=very bad.
[19] Increase in next 5 years is: 1=very likely; 2=likely; 3=neither likely nor unlikely; 4=unlikely; 5=very unlikely.
[20] 1=not at all important, 2=slightly important, 3=moderately important, 4=very important, 5=extremely important.

Findings reported in Tables 6.2 – 6.4 suggest that motivation to solve the problem may have diminished before the follow-up assessment was conducted. At the end of the project participants continued to believe that it was important for their agency to manage negative interactions and complaints about interactions, but some participants placed slightly less importance on the need for BOW to manage those outcomes (Tables 6.2 – 6.4). Some participants thought negative outcomes were less likely to occur when they completed the post assessment (Table 6.3). All participants believed an increase in negative human-bear interactions was "likely" (n=4) or "very likely" (n=4) when the project started. After the project all eight participants believed an increase in negative interactions was "likely" (but not "very likely").

Mechanisms for Achieving Desired Outcomes

Implementation of the modeling project

Reflection on the modeling process suggests both strengths and weaknesses that may have affected achievement of desired outcomes. On the positive side, the project was fully implemented, following best practice recommendations. On the negative side, the project took longer to complete than the 12-month completion time expected by the modeling team. Complexity of the model structure and competing time commitments for the modeling team contributed to long time lapse between segments of the work (i.e., lapse between the early modeling workshops and completion of a first-round quantitative model, lapse between completion of the quantitative model was completion of a user-friendly interface to operate the quantitative model).

Mechanisms for persuasive communication

Rouwette (2003) suggested that group modeling project may serve as persuasive communication when project participants have opportunities for open dialogue, where they exchange high-quality arguments (viewpoints) representing

competing mental models of a problem. I examined whether the project created mechanisms that enhanced participants' ability to process information. Evaluation findings suggest that some, but not all of the mechanisms necessary for persuasive communication were established.

All participants believed the GMB project gave them opportunities to voice their opinion and to discuss divergent opinions (Table 6.5). All believed the project included adequate opportunities for open and extensive discussion and that communication between project participants was clear and understandable (Table 6.5). Nevertheless, at the end of the project seven of eight participants disagreed that communication between process facilitators and the project team was clear and understandable, and the same number were unsure how their agency intended to use information from the modeling project (Table 6.5). The group made a decision to extend the project through a stage that involved creating an interface for the model (i.e., a control panel to make the model accessible to nonmodelers for purposes of bear management simulations), as a means to improve communications between the facilitators and project participants. That step was completed after the post-modeling assessment.

The participants in the modeling project represented a cross section of personnel at different levels within the agency, from regional biologists to Chief of the Bureau of Wildlife. I solicited and obtained involvement from all 10 staff in the agency who had responsibilities for implementing bear management actions (two of those staff were not able to participate in the entire project and did not complete pre- or post- project evaluation questionnaires). As a designated management team, this working group was charged with the task of developing a comprehensive, statewide bear management plan. Part of the groups' responsibilities included making bear management action recommendations to the agency's senior leadership.

Table 6.5. Items assessing whether participants believed the group model building process created conditions hypothesized to increase the likelihood of information processing.

	Mean[21]	1 (SA)	2 (A)	3 (N)	4 (D)	5 (SD)
Everyone in the group had a chance to voice their opinions.	1.25	75.0	25.0	0.0	0.0	0.0
There was ample opportunity to discuss points where people had divergent opinions.	1.75	25.0	75.0	0.0	0.0	0.0
Communication between team members and process facilitators was clear and understandable.	1.88	0.0	14.3	57.1	28.6	0.0
There was adequate opportunity for open and extensive discussion.	2.00	25.0	62.5	12.5	0.0	0.0
Communication between Bear Team members was clear and understandable.	2.00	12.5	75.0	12.5	0.0	0.0
The process included staff with diverse opinions on bear management.	2.50	0.0	75.0	0.0	25.0	0.0
It was clear to me how BOW intends to use information from this process.	3.50	0.0	12.5	25.0	62.5	0.0

[21] 1=Strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree.

Most participants believed the project included staff with diverse opinions on bear management (Table 6.5). However, results presented in the following sections suggest that participants' beliefs about the management actions discussed were quite uniform. All participants had similar professional backgrounds (i.e., they all had training in wildlife or fisheries management). Perhaps because of that uniformity, competing views of the problem system did not emerge. Participants voiced a few disagreements about details within the model, but during modeling sessions participants never offered competing viewpoints about the efficacy of the three management actions under discussion or the relationship between variables in the problem system. Participants never exchanged high quality arguments (viewpoints) representing competing mental models of a problem system.

GMB Project Outcomes

Managing complaints by increasing hunting opportunity

Prior to model development, all participants believed opening hunting seasons earlier or opening more areas to hunting would reduce the size of the bear population, and in doing so, would reduce negative human-bear interactions with, and complaints about bears in residential areas (Table 6.6). Before and after the project participants believed that increasing hunting opportunity would be beneficial and participants held favorable attitudes toward increasing bear hunting opportunity (Table 6.7).

Results from simulation runs (indicating that increasing hunting pressure on bears was an effective short-term policy to reduce complaints about bears) were consistent with beliefs held by most team members prior to model development. Post-project evaluation showed little change in team members' beliefs about hunting as a management tool to control complaints about bear-related problems (Tables 6.6 -6.7). Developing and using the model to simulate bear management actions reinforced the widely-held belief that increasing hunting opportunity is an important facet of

Table 6.6. Items assessing expectations of how opening hunting seasons earlier or opening more areas for hunting would increase or decrease prevalence of outcomes that might be produced when black bears are present in residential areas (i.e., behavioral beliefs that a certain management action will produce desired effects).

	Hunting seasons opened earlier (mean[22])		More hunting areas opened (mean[22])		Prevention education increased (mean[22])		More staff capacity to respond to complaints (mean[22])	
	Pre exposure	Post exposure	Pre exposure	Post exposure	Pre exposure	Post exposure	Pre exposure	Post exposure
Negative human-bear interactions	3.88	3.75	3.75	4.00	3.88	3.88	NA	3.50
Concern about bear problems	3.25	3.25	3.25	3.38	3.88	4.00	NA	3.25
Tolerance for bear problems	2.63	3.13	2.63	2.88	2.75	2.63	NA	3.00
Complaints about bear problems	3.50	3.88	3.50	4.00	3.38	3.63	NA	2.88

[22] 1=increase greatly, 2=increase slightly, 3=will not change, 4=decrease slightly, 5=decrease greatly.

managing problem interactions with, and complaints about, black bears in New York. Participants retained strong intentions to use hunting opportunity as a management tool to control problem interactions with bears (Table 6.8). Moreover, both before and after the project participants believed their peers expected them to use hunting as a bear management tool (Table 6.9) and they did not perceive overwhelming impediments to implementing hunting opportunity as a management tool (Table 6.10).

During the modeling project, New York's wildlife agency commissioner approved a staff proposal to open several additional wildlife management units for bear hunting. That action may have reduced participants' motivations to pursue additional increases in hunting opportunity by the time they completed post-modeling assessment questions. Participants did not reduce their faith in hunting, but rather had achieved their desired expansion of hunting opportunity while the modeling project was underway.

Although simulation runs did not appear to change managers' beliefs about hunting as a management tool, running simulations with a stock and flow model did point out an important dynamic that unfolds in the problem system over a long time horizon. Results of simulation runs suggested that, in a context where number of households increases steadily over time (a scenario not unlike the one unfolding in New York's Catskill region), regulated hunting alone may not be sufficient to control increase in the number of bear-related complaints. Under such conditions complaint levels begin to exceed the historical baseline over time, because residential development has removed natural habitat, reduced natural food, increased bear attraction to anthropogenic food sources, and thus created more human-bear interactions.

Table 6.7. Practitioner expectations of whether a particular management action would be harmful or beneficial and whether practitioner held a favorable or unfavorable attitude toward DEC taking that action.

	Harmful - Beneficial (mean[23])		Favorable – Unfavorable (mean[24])	
	Pre exposure	Post exposure	Pre exposure	Post exposure
opening southern zone bear hunting seasons earlier would be . . .	3.63	3.88	2.00	1.88
expanding areas for bear hunting would be . . .	4.00	4.13	1.75	1.63
increasing prevention education would be . . .	4.75	4.63	1.13	1.38
Increasing staff for problem response would be . . .	NA	4.00	NA	1.88

Table 6.8. Items assessing behavioral intention toward implementing four management actions.

	Not committed – Strongly committed (mean[25])		Support – Oppose (mean[26])	
	Pre exposure	Post exposure	Pre exposure	Post exposure
Opening southern zone bear hunting seasons earlier	3.13	NA	1.63	2.25
Expanding areas for bear hunting	3.50	NA	1.25	1.75
Increasing prevention education	3.88	NA	1.00	1.50
Increasing staff for problem response	NA	NA	NA	1.88

[23] 1=very harmful, 2=harmful, 3=neither, 4=beneficial, 5=very beneficial.
[24] 1=very favorable, 2=favorable, 3=neither, 4=unfavorable, 5=very unfavorable.
[25] 1=not at all committed, 2=slightly committed, 3=moderately committed, 4=strongly committed.
[26] 1=strongly support, 2=support, 3=neither, 4=oppose, 5=strongly oppose.

Table 6.9. Items assessing subjective norms related to DEC use of four management actions.

Most BOW staff think we should:	Mean[27]	
	Pre exposure	Post exposure
Open bear hunting seasons early in the fall.	2.00	1.75
Expand areas for bear hunting.	1.75	1.88
Increase prevention education.	1.75	1.88
Increase staff available to respond to complaints.	NA	2.25

Table 6.10. Items assessing behavioral control beliefs.

	Easy – Very difficult[28] (mean)		Very small – Very large[29] (mean)	
	Pre exposure	Post exposure	Pre exposure	Post exposure
Opening the Catskill bear hunting season earlier.	3.00	3.13	3.13	3.00
Expanding areas for bear hunting.	3.38	3.13	3.13	2.88
Increasing prevention education.	3.13	2.88	2.75	2.88
Increasing staff available to respond to complaints.	NA	4.25	NA	4.13

[27] 1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree.
[28] 1=very easy, 2=easy, 3=neither, 4=difficult, 5=very difficult.
[29] 1=very small, 2=small, 3=moderate, 4=large, 5=very large.

Managing complaints by increasing problem-prevention education

Before the project most members of the Bear Team believed an increase in prevention education would reduce negative human bear interactions and half thought increasing education would reduce complaints about bears (Table 6.6). Twenty-five percent believed concern about problems with bears would decline if problem prevention education were increased (Table 6.6). Before and after the project participants believed that increasing prevention education would be beneficial and participants held favorable attitudes toward increasing prevention education (Table 6.7). Most said they would strongly support a team recommendation to increase prevention education (Table 6.8). In fact, during model development the team supported and promoted a pilot test of a prevention program in 4 Catskill communities (Gore and Knuth 2006, Gore et al. in review).

After the project, the majority of team members (87%) still expressed a belief that increasing prevention education would reduce negative interactions with bears (Table 6.6). All team members thought concern about problems would decrease if more prevention education was offered by DEC (Table 6.6). Seventy-five percent of team members thought complaints would decrease if prevention education was increased (Table 6.6).

In summary, team members expressed continuing confidence in prevention education after the project. All team members said they would support a team recommendation to increase prevention education after the project (Table 6.8). Moreover, both before and after the project, participants believed their peers expected them to increase prevention education as a bear management tool (Table 6.9) and they did not perceive overwhelming impediments to increasing prevention education (Table 6.10).

Such confidence runs contrary to simulation results, which indicated that increasing investment in problem prevention education would do little to reduce negative human-bear interactions or related complaints. Simulations showed prevention education to be the lowest leverage action for reducing complaints about bear-related problems. It is important to note that such results follow from the assumption that prevention education does less to change prevention behavior than it does direct experience, especially a severe problem experience. The optimal solution in management simulations is to maximize hunting, staff level, and investment in education. According to the model, however, education adds little to the solution. In simulations, one can do almost as well without any investment in education if staff capacity and hunting are set at their maximum.

Managing complaints by increasing staff capacity for problem response

The pre-project survey did not assess team members' beliefs about the way that staff capacity to respond to complaints might influence complaint load. Informally, team members did acknowledge a need to have some internal capacity to provide on-site assistance to people with bear-related problems.

Increasing staff capacity to respond to complaints had unexpectedly strong leverage in controlling complaint level using the management simulator. In New York's bear management system, where hunting pressure is exerted in a conservative way, the optimal management response in simulation runs was a combination of hunting pressure and staff capacity to respond to severe complaints.

Simulation runs illustrated that staffing level is especially important in drought years, when bears are more strongly attracted to residential foods and interactions (including severe negative interactions) increase. Managers were already aware that complaints tend to increase in drought years, but developing and exercising the model highlighted the strategic importance of increasing staff in anticipation of those

drought-related problems. The model incorporated an assumption that if complaint loads exceed DEC staff capacity to respond, public concern about bears increases, contributing to a higher rate of complaints about bear-related problems. Adequate staff response reduces concern at a community level and thus reduces overall complaint load from a community.

At the end of the project, five of eight participants believed that increasing staff capacity to respond to complaints would likely produce a slight decrease in negative human-bear interactions (Table 6.6). However, four to six participants believed concern about negative interactions, tolerance for bears, and complaints about problems would stay the same if staff capacity for problem response were increased (Table 6.6). After the project, seven of eight participants believed increasing staff capacity would be beneficial and all had a favorable opinion toward increasing staff capacity to respond to bear problems (Table 6.7). All but one participant supported an increase in staff capacity (Table 6.8). Half of participants, however, thought that most DEC staff would not want to increase staff capacity to respond to bear problem complaints (Table 6.9) and they believed that it would be difficult or very difficult to increase staff capacity for that purpose (Table 6.10). In comparison to other management actions discussed, participants perceived that changing staff capacity would be the most difficult change for their agency to implement.

Attainment of GMB project objectives and desired end products

Participants identified understanding, consensus, commitment, and simulations as the desired outcomes of the project. Observations, participant comments, and final products provide evidence that the project attained three of the four outcomes desired by participants.

Learning and understanding. All participants reported that the modeling project was valuable as a learning experience, and that they learned the most from the process rather than the product of the exercise. Most reported that the experience helped them gain better understanding of one another, the bear management system, and how to manage negative interactions with bears in residential areas (Table 6.11). Seven of eight participants believed the project was useful as a way to stimulate thinking about means to achieve management objectives and as a means to clarify how bears impact people in residential areas (Tables 6.11 -6.12). In the post-modeling debriefing sessions, participants responded unanimously that the project had achieved research objectives 1 and 2 (i.e., they believed the project increased their understanding of the problem system and the main actions their agency takes to manage the problem). Participants said that the project achieved many of the expectations they articulated in a "hopes and fears" exercise they completed in the first modeling workshop. They believed that the project yielded understanding about the management system and will encourage DEC staff to approach bear management as an ongoing, dynamic process.

Feedback at multiple points suggested that participants learned the most in the early stages of the project, and that the process was valuable as a catalyst to help them learn from one another. Those beliefs were expressed repeatedly in practitioner interviews in 2008.

> I think the earlier steps, putting things on the table, what we've learned, what affects one thing versus the other, and trying to come up with those diagrams, all worked well. And both ends, really nice when we did that class, classes [the four model-building workshops]. [R10]

Table 6.11. Items assessing whether the group model building process produced desired outcomes related to learning, consensus building, or decision making efficiency.

The group model building process . . .	Mean[30]	1 (SA)	2 (A)	3 (N)	4 (D)	5 (SD)
Gave me insight into the possibilities for managing impacts.	2.00	12.5	75.0	12.5	0.0	0.0
Improved my understanding of the opinions of other Bear Team members.	2.25	0.0	75.0	25.0	0.0	0.0
Increased my understanding of the system of factors that produce complaints about residential bear-related problems.	2.50	0.0	75.0	0.0	25.0	0.0
Improved communication between Bear Team members.	2.50	0.0	62.5	25.0	12.5	0.0
The Bear Team gained insight about managing negative human-bear interactions in residential areas.	2.63	0.0	62.5	12.5	25.0	0.0
Helped the Bear Team move closer to a shared vision of the bear management system.	2.63	0.0	62.5	12.5	25.0	0.0
Was an efficient way to get staff input for BOW decisions about black bear management.	2.63	0.0	50.0	37.5	12.5	0.0
I learned more about the ways that black bears impact people.	3.13	25.0	0.0	37.5	37.5	0.0

[30] 1=Strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree.

Table 6.12. Items assessing how participants rated the process as a way to stimulate thinking about impacts and ends-means connections.

How would you rate the group model building process on the following:	Mean[31]	Very poor	poor	good	Very good	Not sure
As a way to stimulate thinking about what might be the best management strategies (means) to achieve desired outcomes (ends) in residential areas.	3.29	0.0	12.5	37.5	37.5	12.5
As a way to clarify how bears impact people in residential areas.	3.00	0.0	12.5	75.0	12.5	0.0
As a way to identify which impacts matter most to people in residential areas.	2.88	0.0	25.0	62.5	12.5	0.0

> I think where it had good value was in the discussions amongst members of the team when we're trying to identify some of the cause and effect - things that might be contribute to the whole impact system and you, kind of fleshed out some areas of agreements, some areas of disagreement, myths, some ideas, just gave us a structured way to explore all of those. So I think it had that – kind of team building value in terms of having folks share their experiences and thoughts. And get those out on the table. [R06]

> …whether the simulation itself is really useful or not I don't know, but just the mere discussion and the creation of the spaghetti has a lot of value. It really, put together – especially if you have a very dynamic issue. … where you've got biological issues, ecological issues, social issues, hunting season, consumptive – nonconsumptive uses, etc. It really is a really interesting way to kind of put all that together on one piece of paper. Again, I think the participants have to be open to it because we've got a lot of old school guys that, you know, they know it all or they know a lot about it it's just that they don't want to take the time to actually look at it on paper. [R02]

> The primary value I saw in model building was that it allowed, especially the newer Bear Team members, to be exposed to the older people's understanding of what the system looked like. In terms of things such as precipitation, etc.,

[31] 1=very poor, 2=poor, 3=good, 4=very good; "not sure" responses not included in calculation of mean.

> all those factors that can come into play. And I think …some of the newer people didn't quite have a grasp of that. [R07]

The project served to identify information gaps and research needs related to management of bear-related problems. When asked whether he found the model useful, one participant said, "It does for me what most models do. It tells me what I didn't know and tells me where to start looking for answers about the questions I can't answer." Quantitative modeling was necessary, in this person's mind, to identify such information gaps, because qualitative modeling does not challenge assumptions and does not force wildlife managers to carefully articulate their beliefs.

Consensus problem definition. Participants created a consensus problem definition (described in Siemer and Otto 2005) as one of the first steps in the modeling process. The causal loop diagram developed by project facilitators and participants (Figure 6.2) is a graphical representation of participants' mental model of the system that generates residential problems with black bears. The CLD and background information associated with it represents the first complete articulation of the bear management system in New York State. The CLD provides a resource DEC can use in coming years to train new staff and to craft consistent messages about their management program.

Modeling and simulation tools. One of the original goals of the GMB project was to produce a model(s) that could be used for internal communication among staff and external communication between agency staff and stakeholders. That goal was met: a quantitative model was completed and a related simulation interface was produced and distributed for public use (see Siemer et al. 2007c). The act of synthesizing diverse knowledge bases in the form of qualitative and quantitative models was valued by AIM practitioners.

> I've been particularly impressed by the amount of information captured in the model ('behind the curtains'). The simulation provides a good demo of the value of active management, with undesirable outcomes from either overly aggressive or overly conservative approaches. [R06]
>
> …it [the modeling work] did bring out information that we've had sitting around for awhile or that we've had out there, and we were able to relate that information. Which was nice to see, from some of the data that we've collected. [R10]

Modeling the problem together seemed to create a sense of participant ownership in the CLD. Participants expressed confidence that the CLD reflected their mental model of the management system. Toward the end of the project, final calibration and repeated policy analysis sessions with the group continued to build confidence in the stock and flow (quantitative) model as a potential communication tool for use with stakeholders. The subgroup of three participants we worked with during the model finalization stage expressed interest in potential use of the model for communication with citizen advisory councils and administrators who make final decisions about proposed regulation changes.

Stave (2002) asserts that a system dynamics approach that can improve public involvement in policy discussions by documenting assumptions, choices, and consideration of stakeholder input. The CLD and stock-flow model produced in this project provide an unprecedented level of documentation about assumptions and choices of bear managers in New York. Having the information synthesized in a way that can be consistently communicated to other managers and stakeholders should make the bear management program more transparent and open to healthy discussion about program improvement. Articulating New York's bear management program was perhaps the most important, and certainly the most tangible, product associated with the work.

The project did not meet participants' expectations of a simulation that could easily be tailored to reflect regional parameters. The modeling team was not able to accommodate that expectation given time and budget constraints.

Model use for issue education with stakeholders. At the close of the project, one participant had used the simulation with a group of stakeholders and found the experience very rewarding as a vehicle for discussion of a local bear management issue. None of the other participants had immediate plans to use the interface with stakeholders, and some expressed reluctance to do so. Some reported that they still were not familiar enough with the model and simulation to have confidence using it with external stakeholders. Others were reluctant to share the simulation with external stakeholders. They thought the project was a useful learning experience for agency staff, but not appropriate for communication with external stakeholders (e.g., could be confusing or misleading for lay persons who did not have as much information about the model development process as the participants).

Earlier optimism about the potential for using the simulation as an external communication tool had faded by 2008. Ultimately, practitioners expressed a lack of confidence in model inputs and were uncomfortable with the idea of sharing the model outside the agency.

Commitment to management actions. Several findings reported in Table 6.13 suggest that the process did not create a broader decision frame. It did not stimulate participants to consider a broader range of viewpoints than they would have otherwise. Rather than prompting the group to consider new action alternatives or a broader range of alternatives, the project seemed to reinforce participants' pre-existing inclination to build the bear management program around regulated bear hunting. Participants gained more benefits from the process of model building than from the final products

Table 6.13. Items assessing whether the group model building process contributed to a broader decision frame than would have otherwise been constructed.

	Mean[32]	1 (SA)	2 (A)	3 (N)	4 (D)	5 (SD)
The actions that team members suggested to manage complaints were based on sound arguments.	2.25	0.0	75.0	25.0	0.0	0.0
This process required team members to consider a broader range of viewpoints than they would have otherwise.	2.38	12.5	50.0	25.0	12.5	0.0
This process got the team thinking about management action alternatives that I would not given much consideration otherwise.	2.63	0.0	62.5	12.5	25.0	0.0
This process got the team focused on a management problem that I would not have given much consideration otherwise.	2.88	0.0	37.5	37.5	25.0	0.0
In the process the pros and cons of possible solutions were attended to.	2.88	0.0	50.0	12.5	37.5	0.0
A broad range of useful solutions were discussed.	3.00	0.0	50.0	0.0	50.0	0.0
All the impacts that need attention in residential areas were discussed.	3.25	0.0	25.0	25.0	50.0	0.0

[32] 1=Strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree.

created in that process. One participant summed things up by saying, "We learned the most along the way, not at the end."

Discussion and Conclusions

New York' pilot test of GMB with a team of wildlife professionals was an ambitious undertaking with multiple expectations. Objective critique of both the projects' accomplishments and shortcomings reveals insights that can inform wildlife management professionals as they consider whether and to what degree they may use GMB or other quantitative modeling approaches in the future. In this section, I summarize project conclusions and I offer judgments about why expectations related to learning were met while expectations for decision support were not. Evaluative questions listed in chapter 3 (methods) served as a touchstone for my judgments.

GMB as a tool to create system understanding

Evaluative feedback summarized in this chapter suggests that the project met many expectations with regard to group learning about managing negative human-black bear interactions in residential areas of New York. The experience suggests that GMB work, using the standard method, holds promise as a means to help teams of wildlife managers gain a deeper understanding about the complex interactions in the systems they strive to manage (i.e., evidence that the tool can be useful for learning and communication within teams of wildlife professionals).

Explaining why learning expectations were met

GMB projects require effective communication support, process structuring, and information processing to be successful (Zigurs and Buckland 1998, cited in Luna-Reyes 2006). Communication support comes from using appropriate meeting facilities, correct room configuration, and providing continuous feedback from the modeling team (Luna-Reyes 2006). Process structuring is provided when the modeling team fulfills facilitation and analysis roles (Luna-Reyes 2006). Information

processing is provided through use of system dynamics tools such as reference modes, causal loop diagrams, and quantitative simulations (Luna-Reyes 2006). I believe that participants experienced learning because our project followed best practices and effectively provided communication support, process structuring, and information processing support.

This pilot test provided a practical example of the conditions necessary to conduct a useful GMB project in a wildlife management context. One component of a successful group modeling project is involving a modeler who can work with wildlife managers to articulate their mental model and convert that mental model into a qualitative or quantitative dynamic systems model. GMB projects also call for a high level of trust and communication between the modeler and the project team, because developing a quantitative model requires access to detailed information about wildlife programs. GMB was possible in our case because we had the trust of the project team from the outset.

The GMB initiative was only one of several research and outreach projects completed for NYSDEC by Cornell researchers as part of AIM for black bear management. Each of those initiatives included efforts to get managers or stakeholders to explicitly state how and why they believe specific management actions will achieve desired end states. I believe these cumulative efforts may have built managers' capacity to learn from the GMB project.

One of the process scripts we utilized involved asking participants to graph expected change in key variables in the problem system over time. We also asked participants to discuss their assumptions about relationships between pairs of key variables in the problem system. Creating those graphs (referred to in Vensim models as "lookup tables") obligated our participants to think through many assumptions. The process of articulating those assumptions created learning opportunities. As noted

earlier, participants generally held similar beliefs, but there were some cases where group members differed with regard to their beliefs about the shape of a lookup table function. These discrepancies pointed out research needs and offered potential avenues for future discussion with stakeholder groups about the shape of lookup functions on critical variables. One can imagine, for example, cases where a stakeholder group like animal protectionists may have very different beliefs about the shape of lookup tables related to the effect of education on problem prevention behavior. Participants seemed to enjoy and learn from these exercises.

GMB as mutual persuasion

Ultimately, the model did not persuade participants to change their beliefs about the management actions under discussion. Some participants left with the sense that the model simply reflected their existing beliefs and didn't tell them anything new. Participants were reluctant to believe that the model presented higher quality arguments than they already had to support their beliefs.

Explaining lack of belief change about management actions

We successfully elicited a mental model held collectively by participants, but documenting and quantifying the clients' mental model raised few questions in their minds. Moreover, simulations using the underlying model yielded few surprising results, so it is doubtful that participants were challenged to think creatively about their problem or possible solutions to their problem.

Participants demonstrated a confidence in problem prevention education that exceeds what one might expect if only considering results from the bear management simulator. One might conclude that confidence in prevention education stems from a variety of sources unrelated to its efficacy in reducing complaints about bear-related problems. Educating people and raising knowledge/awareness is universally valued by managers and stakeholders. Perhaps these deep-seated beliefs act as heuristics that

cloud judgments about specific educational applications in the context of residential bear management.

Reluctance of participants to call for staff increases also run contrary to simulation results and may be indicative of general pressures on the agency, rather than attitudes and beliefs about staffing as a means to reduce bear-problem complaints. Agency staff size has decreased over time. The agency has reduced the number of staff dedicated to serving the bear management program in recent years and participants may believe it is unlikely that senior leadership in the agency would redirect or hire more staff for the bear program. Whether it would help or not, participants many have believed that new staff hires were outside the realm of possibility in their agency.

Rouwette (2003) argued that one should only expect a modeling project to change attitudes and beliefs when modeling participants focus on a problem they are motivated to solve, and when participants offer persuasive arguments to support divergent belief structures. I found some evidence that participants' motivation to act on the problem under study had waned by the end of the project. More importantly, persuasive arguments representing competing mental models were never offered. Thus, the conditions for this GMB project to serve as a process of persuasion were not fully satisfied.

The success of a GMB project depends in part on the composition of the modeling group. The concept of group modeling or participatory modeling approaches is to bring together people who view a problem from different perspectives. Those different perspectives may occur because the participants come from different organizations, different stakeholder groups, or different professional roles within an organization (e.g., a corporate GMB project may pull together specialists in marketing, engineering, manufacturing, human resources, and corporate

law). Our pilot program included participants from just one organization. Although participants came from a variety of different roles within the wildlife agency, I found that they held similar beliefs and perceptions about the problem system. Since group members did not hold diverse beliefs, the model they went on to construct did not include competing views of the problem system. Participants did not challenge existing beliefs by offering persuasive arguments for an alternative mental model of the problem system. In the end, participants seemed to feel like they had modeled something they "already knew."

Another potential explanation for lack of belief change comes from a shortcoming in the evaluation itself. Timing of the assessments was problematic. Questionnaires could not be designed and implemented until a problem statement and a clear sense of project focus had developed. Thus, we could not implement the pre-modeling assessment until the third modeling workshop. The post assessment was implemented about 10 months later (December 2005). By that time, facilitators had run the model with the group more than once, but it was a full year later before a simulation interface was available to practitioners. Some participants said they had not spent enough time exploring the model to be familiar with insights until fall 2006 (another indication that AIM practitioners were not motivated to use it as a decision-making aid).

It also is worth noting that the nature of the activity detracted from participants' ability to process information. Participants sometimes had difficulty following the facilitators during the modeling sessions. The mechanics of the process can be confusing and since this was a novel approach for participants, at some points participants were uncertain about where the process might be heading. Though the model served to integrate a great deal of information, the quantitative step was difficult, slow, and done by the modelers alone at some points.

GMB as a decision support tool

The project fell short of expectations as a decision support tool for wildlife managers. Participants did not use the information in a formal choice about management actions or policies.

Explaining why decision support expectations were unmet

A combination of factors may have contributed to this negative outcome. It may not have contributed to decision making because participants did not change their belief that hunting bears is the most effective management action and, by the end of the project, they had already taken steps to increase hunting opportunity.

It is also fair to say that the process took longer to complete than expected. Momentum established during the first three workshops was lost as the modelers separated themselves from participants for long periods of quantitative modeling. Further delays occurred when participants continued suggesting model revisions and when the modelers encountered unexpected problems with the modeling software. As the process stretched out and complaints about bears declined, participants may have lost motivation to use the model to support decision recommendations.

From the beginning of the project (in workshop 1), participants expressed a concern that they wouldn't be able to provide much hard data to include in the model. In subsequent workshops some participants said that lack of hard data made them reluctant to trust the model as a decision-making tool. Skepticism about model inputs may help explain why participants never put faith in the model as a decision-making aid, even though they found it useful as a tool to support internal staff discussions.

Another important issue is that the pilot project was never formally linked to an agency decision-making process. The project was initiated with the hope that results from a GMB process would be an aid to participants, who as a group can make management action recommendations to senior leadership in their agency (in the form

of recommendations for regulatory changes). I assumed the participants would use project findings to make action recommendations to senior decision makers, but those expectations were not formalized by the group. In retrospect, it may have been unrealistic for me to assume the project would lead directly to decision making. Some time down the road managers may use it in communication with senior leadership if they are asking for an expansion of areas open to hunting.

Reluctance to use the model as a decision recommendation aid may also stem from apprehensions participants have with how their efforts will be viewed by stakeholders. The participants come from an institution that is risk averse. Given the controversial nature of wildlife management, participants were reluctant to share ideas with the public if those ideas are exploratory. Some participants thought stakeholders might misunderstand the model and that the model could lead to miscommunication about bear management.

Monitoring and adaptive management experiments

This case began as a practice of impact management and never reached a decision point where practitioners considered use of management experiments that would allow the program to become an active adaptive approach. Passive adaptive management involves monitoring to learn from management actions. The case did include this passive adaptive approach for one set of impacts. Monitoring related to other impacts remained unchanged, however. Monitoring has long been a weakness within wildlife agencies and can be expected to remain an impediment to the development of even passive adaptive approaches in practice. Thus, if the concept of adaptive impact management is adopted more widely in the wildlife management profession, it is likely to be implemented as impact management (IM) rather than adaptive impact management.

Systems thinking as a mechanism to enhance agency performance

Findings from this case study lead me to conclude that quantitative systems modeling exercises are not likely to be adopted as a practice to inform transactional approaches to stakeholder engagement or decision making within wildlife agencies. The catalysts for such modeling will not be present in most cases and a long list of impediments to quantitative modeling will likely dissuade practitioners considering such exercises.

On the other hand, case study findings lead to optimism about the potential for wider adoption of systems thinking exercises to inform a practice of impacts management. The wildlife professionals who participated in this case were enthusiastic supporters of the concept of systems thinking and believed that their agency performance was improved by systems thinking exercises. Relatively simple, yet powerful tools and training are available to promote systems thinking, given a sponsor agency has interest in providing resources and support to conduct systems thinking exercises with management teams.

Challenging underlying assumptions of impact management

Careful assessment of and reflection on the systems thinking exercises used in this case provided support for the underlying assumption that deliberation within interdisciplinary teams of wildlife professionals can stimulate learning. There are, however, considerable challenges to implementing the concept of systems thinking in exercises that are appropriate both to the public issues facing wildlife managers, and to the skill sets and resources available to managers and stakeholders. This case provides confidence in the premise that systems thinking could encourage value-focused thinking. In practice, that ultimate goal cannot be achieved until successful forms of systems thinking are developed and implemented routinely within state wildlife agencies.

CHAPTER SEVEN

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS FOR THE PRACTICE OF IMPACTS MANAGEMENT

Introduction

The purpose of this case study was to assess the process and outcomes of a multi-year pilot use of adaptive impact management and, based on case research insights, offer conclusions and recommendations for wildlife professionals interested in the practice of impact management by state wildlife management agencies. In chapters 4-6, I presented findings from case research focused on embedded units of analysis and specific components of AIM. In this closing chapter, I synthesize conclusions across all aspects of the case study. I discuss the implications and new research questions that this case study raises for continued adoption of AIM concepts within state wildlife agencies. Finally, I step back from the specific pieces of inquiry to recommend actions that engaged scholars and wildlife agencies can take to encourage wider diffusion of AIM as an innovation and incremental improvement of impact management in practice.

Conclusions and Implications for AIM in Practice

Case research on AIM for black bear management in New York from 2001 to 2008 provides tangible evidence that wildlife agencies can operationalize and implement AIM concepts under actual field conditions. Findings from this case study demonstrate that implementation of transactional stakeholder engagement, impacts-focused situational analysis, and exercises to encourage systems thinking can produce learning, knowledge integration, administrative support for regulatory proposals, and other positive outcomes. Case research documented that a wildlife agency can attain, or can hold reasonable expectations that over time it will obtain, many of the expected benefits in agency performance described in AIM foundational documents. Moreover,

case study findings provide support for many key underlying assumptions of AIM as a conceptual framework for stakeholder engagement and decision making. Findings from this case suggest that the AIM conceptual framework holds potential to help wildlife management practitioners consider and integrate a broader information base, which may ultimately improve decision making and the value of state wildlife agencies to society. Positive findings from this case lead me to conclude that the AIM approach merits further development and field trial.

But case study findings also bring to light a number of barriers that will impede trial use of AIM concepts by state wildlife agencies. Findings about the catalysts and impediments to AIM adoption and implementation in this case lead me to conclude that short-term diffusion and adoption of AIM will depend on continued intervention and support by engaged scholars. Sustainability and utility of AIM will also depend on the ability of state wildlife agencies to make structural changes that increase internal capacity for transactional communication with stakeholders.

In the following subsections I summarize these and other conclusions. I also discuss implications of case research findings for implementation of AIM and an informed transactional approach to stakeholder engagement.

Embedded units of analysis: Conclusions synthesis

Impacts management

Case research findings support the conclusion that focusing on stakeholder-defined impacts was the most useful and deeply adopted aspect of the AIM pilot project. Jargon and definition of terms made it difficult for practitioners to learn and implement impact identification exercises in the early stages of the work. But practitioners grew to be very positive about this aspect of AIM after they developed familiarity with terms and processes like the SIG process. Practitioners were willing to participate in delivery of the SIG process and they were able to implement the

process after training. They demonstrated that this aspect of AIM can be successfully implemented by practitioners, so long as they have some support and on-the-job training (which they can get from other agency staff who have been part of a prior implementation).

I found that use of impact identification processes was consistent with practitioner beliefs and represented an incremental change in how wildlife managers in New York go about their work. I believe that consistency with professional beliefs and practices helps explain why this component of AIM was readily adopted. Impacts management was consistent, for example, with practitioners' normative belief that stakeholders should provide input to wildlife management decisions, and with their agency's practice of actively seeking citizen input on proposed regulatory changes.

Members of the Bear Team were confident that their focus on impacts would continue to be implemented. A small number of agency staff are now motivated to utilize an impacts approach to guide their work. They represent a cohort of early adopters who should receive continued support and AIM training, so that they can go on to kindle further diffusion of AIM practices within the agency. Implementation of AIM practices will cease, I believe, unless a cadre of internal staff are trained to be AIM trainers of other staff. In small working units, such as BOW, the same staff often serve on multiple teams, so a natural social network is already in place for diffusion of AIM ideas across organizational working groups.

Media monitoring and research

Practitioners in this case found quantitative media monitoring both interesting and useful. Adding a media element to AIM implementation was consistent with their professional beliefs. I believe those factors explain why it was relatively easy to gain adoption of these approaches. It is also true, however, that practitioners have no capacity to do this work on their own. One implication of these findings is that media

monitoring is an area ripe for applied research. Practitioners appreciate and benefit from quantitative media monitoring on wildlife issues. Academicians can utilize contract research opportunities with AIM sponsors to pursue communication research that makes both scholarly and applied contributions. For example, in this case, interest of the sponsor agency created an opportunity for a group of engaged scholars to conduct both media monitoring (that was of immediate practical value to the sponsor) and media effects work (that was of less immediate value to the sponsor, but made a contribution to the literature on factors effecting stakeholder concern and risk perception).

Systems thinking and systems modeling

Systems thinking was viewed positively by practitioners. Group model building was regarded as useful in the early stages, but not as a decision making aid. Findings in this area lead to the conclusion that increased systems thinking is an innovation that can benefit AIM sponsors and stakeholders. Means for encouraging systems thinking that are appropriate for practitioners' skills and needs should be explored further. Findings from our GMB project lead to the conclusion that quantitative modeling efforts may not be appropriate as part of AIM implementation. Due to their complexity and expense, I do not foresee quantitative modeling exercises becoming a common element of AIM approaches.

Underlying assumptions of AIM

Findings from this case were consistent with several linked assumptions underlying AIM. For example, case findings supported the assumptions that: (1) AIM implementation can create more deliberation, among practitioners and between practitioners and stakeholders; (2) increased deliberation will produce learning by stakeholders; and (3) AIM approaches may encourage value-focused thinking. Though not definitive, case research findings lead to a tentative conclusion that AIM

principles can be put into practice and that the key underlying assumptions of AIM can be expected to hold in practice. These assumptions should continue to receive critical review, but this first evaluation suggests that the AIM conceptual framework merits further development and trial in practice.

Decision frames represent an exception to the statements above. I did not find evidence that this AIM implementation changed managers' decision frames. That finding may not mean that AIM would never change decision frames. Influences of AIM on decision frames remain an area in need of additional research.

Informed transactional approach to stakeholder engagement

One pattern that emerged across AIM elements and units of analysis was a consistent difficulty in providing feedback. It is difficult for practitioners to provide adequate feedback, whether it be to management stakeholders, mass media, or other wildlife management professionals. Agency image studies in New York have consistently shown that publics perceive BOW as being weak in the area of communication (Decker 1985, Shanahan et al. 2001). Interview comments demonstrated that practitioners recognize this weakness. The SIG process developed during this case represented a real innovation in stakeholder engagement. It was widely viewed as a positive development by practitioners and stakeholders. The drawback of the process is that it reaches very few people. The implication of these findings is that expected benefits of AIM implementation will not be attained unless additional mechanisms are developed and implemented to create an informed transactional approach to stakeholder engagement.

Adaptive management

Practitioners in this case never seriously considered implementing an active adaptive component to their work. Thus, the case offers little insight about the adaptive component of AIM. However, it became clear during the process that active

adaptive management represents a level of rigor that is not consistent with the culture or structure of this agency. Observations during this case lead me to speculate that adaptive management is an ideal that will seldom be realized in practice. In fact, it seems so unlikely that it may be worthwhile to recast the nomenclature of AIM to drop reference to adaptive management. The emphasis on impact management may be more useful and renaming the approach "impact management" could encourage trial and adoption. Designing different "levels" of AIM implementation also may encourage adoption. For example AIM scholars could work with AIM sponsors to select different levels of AIM based on results of situational analysis. Some issues may be manageable with a quick, qualitative form of impact management. Other issues may call for more rigorous impact identification and clarification and monitoring (passive adaptive work). In a few, cases, the time and expense of management experiments (active adaptive management) may be appropriate.

Issue education

The case of AIM for black bear management in New York offers encouragement to wildlife professionals who aspire to make progress toward the ideal of integration in wildlife management. This case supports the assertion that framing wildlife management problems around the concept of stakeholder-defined impacts will encourage value-focused processes and value-focused thinking.

Because AIM essentially defines wildlife management challenges as public policy issues, successful implementation of AIM requires a commitment to public issues education. Three kinds of issue education are described in chapter two; in combination those three types of issue education support an informed transactional approach to stakeholder engagement.

This case illustrates that obtaining expected benefits of AIM implementation is linked to the quality of issue education that sponsors conduct as part of their work.

Productive deliberations between managers and stakeholders and among stakeholders with differing viewpoints, interests, or concerns, are critical as a mechanism to stimulate learning and value-focused thinking. Issue education may ultimately play a role in community recognition of new or previously unrecognized impacts as they develop (i.e., it provides a mechanism that may enfranchise more stakeholders as new stakes develop).

This case also illustrates some of the challenges associated with issue education by state wildlife agencies. Practitioners involved in this case perceived value in public issue education. They developed and implemented a round of issue education meetings in several locations across the state in 2007 and 2008, but those meetings were poorly attended. Even if well attended, the agency does not have the capacity to conduct very many issue education exercises.

Diffusion of AIM as an innovation, and the ultimate utility of AIM as an approach, will depend in part on the quality of public issues education associated with AIM in practice. Wildlife management practitioners will need guidance on issue education to effectively implement impact management.

Some incremental improvement could be obtained on issue education just by implementing best practice principles that these agencies have never utilized (there is nowhere to go but up; it is relatively easy to get the first 10-15% of change, and they are at the beginning in this field, so the first leap forward should be “relatively” easy).

The first leap forward could come simply from hiring some consulting expertise. Additional and sustained improvements will only be possible if the agencies build internal capacity, by improving the capacity of existing communication staff or by hiring new staff with issue education or stakeholder engagement skill sets.

Organizational change

BOW's decision to implement an AIM approach for black bear management was essentially a planned change intervention. If successful at all, such interventions typically produce incremental rather than radical change within an organization. Findings demonstrated that the sponsor organization did change their practice by implementing AIM. Implementation of impact management concepts produced an incremental improvement in the processes that wildlife managers in New York had developed to engage stakeholders and make management action recommendations. Improving the processes by which wildlife managers and stakeholders consider information in decision making represents a positive and important step forward in a bureaucratic system that is resistant to innovation, change, and strategic planning. Findings suggested that practitioner's opinions about bear management actions remained unchanged. But it is important to recognize that better informed opinions and a better process for considering professional and lay opinion in decision recommendations are advances, even in cases like this, where management actions remained relatively unchanged. Decision-making literature assures us that a better process for decision making improves the decision maker's odds of achieving better outcomes (Hammond et al. 1999), so it is reasonable to conclude that wider adoption of process improvements associated with AIM would generally enhance agency performance. The challenge will be to support that incremental change, by institutionalizing the process advances piloted in this project and building toward a broader and deeper practice of AIM concepts within the sponsor organization.

The organizational change I observed in this case is consistent with the large body of literature that has amassed on adoption and implementation of innovations. Consistent with the literature, I found that AIM practitioners readily adopted some portions of AIM (e.g., a focus on stakeholder-defined impacts) that: were compatible

with their beliefs, professional values, and work practices; could be tried and implemented relatively easily, and had demonstrated utility in addressing immediate practical needs (i.e., had relative advantage). Also consistent with literature, I found that failure to adopt some portions of AIM (e.g., systems modeling, active adaptive management) could be linked to well-documented adoption impediments, including: complexity, compatibility, cost, trialability, observability, relative advantage, organization culture, and staff skills (capacity).

Recommendations for Advancing AIM

Two main conclusions emerged from this case study. The first was that short-term diffusion and adoption of AIM will depend on continued intervention and support by engaged scholars, at least until agency staff experience and capacity have developed further. The second was that sustainability and utility of AIM will also depend on the ability of state wildlife agencies to make structural changes that increase internal capacity for transactional communication with stakeholders. In closing, I offer the following recommendations to engaged scholars and wildlife management agencies who wish to sponsor AIM approaches. Implementation of these recommendations will encourage diffusion of AIM concepts, trial of AIM practices, and incremental improvement in wildlife management as a comprehensive decision-making process.

Engaged scholars

A growing number of scholars are calling for a renewed mission of service and engaged scholarship within institutions of higher learning (Boyer 1990, 1996; Crosson 1983; O'Meara and Rice 2005, Ward 2003), especially within land-grant universities (Peters et al. 2003, 2005). Boyer (1996:143), among others, urges the professorate of the American academy to practice a "scholarship of engagement."

> Still, our outstanding universities and colleges remain, in my opinion, one of the greatest hopes for intellectual and civic progress in this country. I am convinced that for this hope to be fulfilled, the academy must become a more vigorous partner in the search for answers to our most pressing social, civic, economic, and moral problems, and must reaffirm its historic commitment to what I call the scholarship of engagement.

Boyer (1996:146) proposed "a new paradigm of scholarship, one that assigns the professoriate four essential, interlocking functions." He labeled those functions as: (1) scholarship of discovery; (2) scholarship of integration; (3) scholarship of teaching; (4) and application of knowledge. It is important to note that the emphasis here is on renewed commitment to service. Public universities in the United States were established with a strong public service mission. That mission receded during the first half of the twentieth century, as university systems incentivized scholarship of discovery above other types of scholarship (Ward 2003). Multiple factors led to a re-imagined and revitalized public service mission that historians trace to a mass education period of higher education (1945-1975) (Ward 2003). Service connections between universities and state governments have been increasing since the 1960's (Crosson 1983). University service to state governments takes form as contract research, training, expert testimony, reference services, and assistance drafting legislation (Crosson 1983).

Implementation of AIM for black bear management was made possible by a longstanding service relationship between HDRU (Cornell University academic staff) and DEC. That relationship had created a vehicle by which a trusted group of public scholars could work in partnership with a community of wildlife management professionals interested in addressing an important public issue facing their agency. Benefits notwithstanding, implementation of AIM concepts is likely to fall into disuse unless engaged scholars continue to devote effort to scholarship and outreach learning that supports development of AIM practices. In Table 7.1, I use a typology of

Table 7.1. Recommendations for advancing the practice of AIM, organized within a typology of four forms of scholarship.

Essential functions of academic scholarship	Recommended research and outreach agenda for engaged scholars seeking to advance AIM in practice
Discovery	• Identify and clarify social, psychological, economic, ecological, and health and safety effects produced by interactions between humans and wildlife • Identify and clarify unrecognized impacts • Improve understanding of factors that facilitate or impede transfer of a process innovation (impact management) from its developers to practicing wildlife professionals. • How individual frame of reference and media messages may influence perceptions of wildlife-related effects on humans.
Integration	• Advance techniques and processes to integrate ecological and human dimensions of wildlife management • Develop instruments and processes that AIM practitioners can use to measure impacts
Teaching and learning	• Develop in-service training opportunities for practitioners to learn about AIM concepts • Develop training opportunities to increase practitioner capacity to incorporate systems thinking into practice. • Develop practical case study descriptions of AIM implementation • Develop issue education training experiences for practitioners • Develop AIM-related course materials for use in undergraduate education (e.g., textbooks, book chapters)
Engagement	• Work with AIM sponsors to apply AIM concepts to a range of public issues that vary in scope and focus • Seek opportunities to apply AIM concepts within AIM sponsor agencies with different cultural and organizational characteristics • Pilot test new techniques to support an informed transactional approach to stakeholder engagement.

essential functions of academic scholarship (O'Meara and Rice 2005) to outline a research and outreach agenda for engaged scholars interested in advancing the practice of impact management.

Discovery

Perhaps the most common way in which universities provide service to state and local governments is through contract research. Contract research allows for scholarship of discovery that state agencies have no capacity to produce[33]. This is probably the most natural and comfortable role for university faculty. There is a tremendous capacity for scholarship of discovery within major universities. With regard to scholarship that capacity should be directed as research to identify impacts (Table 7.1). Scholarship that clarifies the crisis in civic engagement would also be useful to state agencies struggling to understand how they can increase public participation in wildlife management decision processes.

Integration

University faculty are not as proficient at integration as they are in discovery, but they are making strides in that direction. These days, there is a great deal of discussion about creating university capacity to study and understand coupled environmental-human systems. Systems thinking and systems modeling exercises can help. The challenge in this area is to find ways to encourage integration that are appropriate for practicing wildlife managers. System modeling exercises developed by and for technical specialists may not be useful for AIM practitioners. We need simpler exercises for practitioners, and somehow we need to be aware of and address a

[33] Crosson (1983:57) notes that government agencies lack capacity by design; is not a characteristic unique to wildlife management agencies or agencies in New York State. A review of government agencies in the 1970's led one researcher to conclude that, "Generally, governmental units are not able to afford the full range of technical personnel necessary to develop new procedures for dealing with day-to-day problems" (Scott 1974:22; cited in Crosson 1983).

growing schism that may be developing between natural resource modelers and the practitioners they believe they are working to inform.

Teaching and learning

Boyer (1990) originally described teaching as one of the essential functions of academic scholarship. In the years following his seminal publication, *Scholarship Reconsidered*, many academics advanced Boyer's basic articulation of scholarship. This category was relabeled as the scholarship of teaching and learning, to emphasize the two-way nature of adult education.

Providing training experiences is a very common way that universities provide service to state government. To encourage trial and adoption of AIM, a range of educational scholarship is needed. Scholars should develop text books and course offerings that will expose undergraduate natural resource management majors to AIM concepts and practices. Scholars should develop in-service training seminars and workshops that teach practitioners about AIM concepts and practices. Our experience at HDRU suggests that the most useful inservice training experiences will teach practitioners the "essence" and AIM principles (Riley et al. 2002, 2003), and will provide them with simple yet powerful conceptual tools to encourage systems thinking and strategic planning focused on impact management. Our experience also suggests AIM educational approaches should involve learners as peer trainers and mentors (e.g., managers' workshops, "train-the-trainer" approaches). The scholarship of teaching and learning should include efforts to evaluate and improve these developing processes for AIM education.

Engagement

Engagement transcends the concept of a one-way delivery service or application of knowledge to a community problem. Ward (2003:50) explains, "Engagement, unlike service connotes reciprocal relationships and transcends

teaching, research, and service." Rice (2005:27-28) describes how the America Association for Higher Education's Forum on Faculty Roles and Rewards has defined the scholarship of engagement.

> …the scholarship of application, which builds on the established academic epistemology, assumes that knowledge is generated in the university or college and then applied to external contexts, with knowledge flowing in one direction, out of the academy.
>
> The scholarship of engagement, in contrast, requires going beyond the 'expert' model that often gets in the way of constructive university-community collaboration. …the scholarship of engagement calls on faculty to move beyond 'outreach,' as it was conceptualized in the land-grand colleges with their agricultural roots. It also asks that the scholar go beyond 'service,' with its overtones of noblesse oblige. What it emphasizes is genuine *collaboration:* that the learning and the teaching be multi-directional and the expertise shared.

Perhaps the central idea of engaged scholarship with respect to the wildlife management context is to work with communities of practitioners to utilize the strengths and assets of both university and community to solve problems of practical import to society. A scholarship of engagement took form in this case as university scholars partnered with a state agency to use an AIM pilot project as a learning opportunity to improve the theory and practice of wildlife management as a public policy process. A continuing scholarship of engagement in this context would include additional field research on a variety of wildlife management issues, and with state agencies that vary in organizational culture and structure (Table 7.1).

Wildlife management agencies

In the long-term, adoption and implementation of AIM in New York will depend on steps that the wildlife agency takes to increase their internal capacity for transactional stakeholder engagement. Agencies can increase communication capacity in three ways. First, they can take steps to increase the efficiency and effectiveness of

existing staff with communications responsibilities (e.g., through staff training, increased use of internet communication tools). Second, they can re-purpose existing communications staff to serve in issue education roles. Finally, they can make a conscious choice to use new hires to increase the proportion of the work force with stakeholder engagement and communication skills.

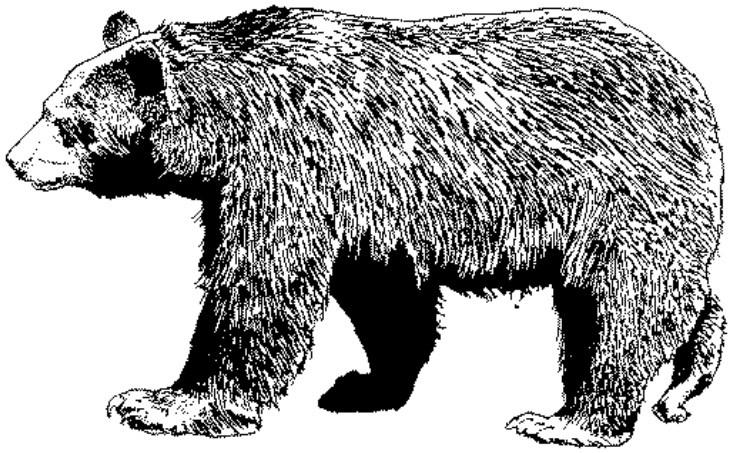
The agency that sponsored AIM implementation in this case is probably representative of many state wildlife agencies with respect to communication capabilities. In a rapidly changing society, wildlife agencies have not adapted their organizational structure enough to keep pace with increased needs for communications capacity, especially capacity for dynamic two-way communication with publics.

It would be naïve to expect wildlife agencies to dramatically increase their staff size or their capacities to conduct two-way communication. However, it is equally naïve to expect expanded and successful AIM implementation in agencies that do not face and address their communication deficits. Failure to address communication capacity will undoubtedly impede use of AIM and potential benefits to agencies that do try AIM approaches. It is my hope that agencies embrace this challenge so that they can remain a relevant force for environmental stewardship in the twenty-first century.

APPENDIX A

A self-administered mail questionnaire used in a statewide black bear management survey implemented in New York State, 2002.

BLACK BEAR IN NEW YORK STATE: YOUR EXPERIENCES AND OPINIONS



Research conducted by the
Human Dimensions Research Unit
Department of Natural Resources
Cornell University
Ithaca, New York 14853

Funded by the New York State
Dept. of Environmental Conservation
Div. of Fish, Wildlife, and Marine Resources
625 Broadway, Albany, NY 12233

Please refer to this map to identify regions and bear hunting areas noted in the questionnaire

THANK YOU FOR YOUR ASSISTANCE!

- Please have this questionnaire filled out by the adult in your household who has had the most recent birthday.

- **Your responses are important!** We would like to hear from EVERYONE who receives this questionnaire, not just those with strong opinions about black bears.

- Please complete this questionnaire at your earliest convenience, fold it, seal it in the enclosed envelope, and drop it in any mailbox. Return postage has been provided.

Your Past Experiences With Black Bears

Note: Any reference to black bears in this survey means free ranging, wild black bears and does not include captive black bears (e.g., bears in zoos, etc.)

1. Before you received this questionnaire, were you aware that black bears live in some areas of New York State? (*Check [✓] one response.*)

   _____ **Yes**

   _____ **No**

2. Have you ever seen a wild black bear anywhere (not just in New York State)? (*Check [✓] one response.*)

   ____ **Yes → → →** If yes, was seeing a black bear a positive or a negative experience? (*Check [✓] one response.*)

   ____ **No**

   ____ **Positive**

   ____ **Negative**

3. Have you ever seen bear tracks or other evidence that black bears were present in an area (anywhere, not just New York State?) (*Check [✓] one response.*)

   ____ **Yes → → →** If yes, was seeing evidence that bear were present a positive or a negative experience? (*Check [✓] one response.*)

   ____ **No**

   ____ **Positive**

   ____ **Negative**

4. Have you or someone you know had any of the following experiences with bears? (*Check* [✓] *ALL that apply.)*

	Yourself	**Someone you know**
Property was damaged by a black bear.	____	____
Black bear threatened or attacked pets.	____	____
Black bear threatened or attacked livestock.	____	____
Personally threatened by a black bear.	____	____
Other experiences with black bear please describe: _____	____	____

5. In the past year, have you read or heard about someone you don't know personally who had any of the following experiences? (*Check* [✓] *ALL that apply).*

In the past year I read or heard about someone who . . .

____ had property damaged by a black bear.

____ had a pet threatened or attacked by a black bear.

____ had livestock threatened or attacked by a black bear.

____ was threatened or attacked by a black bear.

Your Views About Black Bears in New York

6. How would you describe your level of personal interest in black bears in New York? *(Please circle one response.)*

1 No interest → → → IF NO INTEREST, SKIP TO QUESTION 8

2 Low interest

3 Moderate interest

4 High interest

5 Unsure

7. Black bears live in three regions of New York State (see map on inside cover). In which region(s) of New York State are you interested in black bears? (C*ircle ALL that apply.*)

1 Western New York

2 Northern New York

3 Southeastern New York

4 Not interested in black bears in any region

7b. If you have interest in more than one region, which region interests you most?

Region: _____

8. People have different attitudes about black bears. To what extent do you agree or disagree with the following statements about bears? (*Circle one response for each statement.*)

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I enjoy having black bears in New York State.	1	2	3	4	5
I worry about problems that black bears may cause.	1	2	3	4	5
The risk of being threatened by a black bear in New York is acceptably low.	1	2	3	4	5
The risk of being injured by a black bear in New York is acceptably low.	1	2	3	4	5

9. People sometimes encounter black bears near their homes, because black bear are attracted by potential food sources such as bird feeders and garbage containers. Please circle the number between each word pair that best describes your opinion about these encounters in your region of New York. *(Circle one number for each word pair.)*

In my region, incidents where people encounter a black bear near their home are . . .

	Very	Some what	Neither/ nor	Some what	Very	
rare	1	2	3	4	5	common
familiar	1	2	3	4	5	novel
ordinary	1	2	3	4	5	special
safe	1	2	3	4	5	dangerous
negative	1	2	3	4	5	positive
nonthreatening	1	2	3	4	5	threatening

10. How do you think the black bear population in your region of New York State has changed during the past 5 years? (C*ircle one response.*)

    1 Decreased

    2 Remained about the same

    3 Increased

    4 I don't know

11. What change, if any, would you prefer in the population of black bears in each region of New York State? (*Circle one response for each question.*)

Region	More bears	Fewer bears	About the same number of bears	No preference
Western New York	1	2	3	4
Northern New York	1	2	3	4
Southeastern New York	1	2	3	4

12. Black bear are expanding their ranges in western, northern, and southeastern New York. Regulated bear hunting is used to manage the growth of these bear populations (see map of bear hunting areas on inside cover). Please indicate whether you would support or oppose <u>increasing the size</u> of the areas where bear hunting is permitted. (*Circle one response for each statement.*)

Expanding the hunting area in . . .	Strongly support	Support	Undecided	Oppose	Strongly oppose
Western New York	1	2	3	4	5
Northern New York	1	2	3	4	5
Southeastern New York	1	2	3	4	5

13. Black bears sometimes travel through urban areas. Which responses below best represent your views about interaction between people and black bears in urban areas of New York? (*Circle one response for each statement.*) *(1=strongly agree; 2=agree; 3=neither agree nor disagree; 4=disagree; 5=strongly disagree.)*

DEC should . . .	**SA**	**A**	**N**	**D**	**SD**
try to minimize all interactions between people and black bears in urban areas.	1	2	3	4	5
be more willing to capture and relocate black bears in urban areas than in rural areas.	1	2	3	4	5
be more willing to destroy black bears in urban areas than in rural areas.	1	2	3	4	5

14. People place different levels of importance on obtaining benefits associated with having black bears in their area. How important is it to you personally to experience the following benefits? *(Circle one response for each statement.) (1=Not at all important; 2=slightly important; 3=moderately important; 4=very important; 5=unsure.)*

	Importance level				
Just knowing that bears exist nearby.	1	2	3	4	5
Getting personal enjoyment from activities where I might see black bears.	1	2	3	4	5
Learning more about black bears in my area.	1	2	3	4	5
Spending time with family and friends during activities where I might see black bears.	1	2	3	4	5
Reducing public misperceptions about black bears.	1	2	3	4	5
Becoming more connected to nature by seeing bears or evidence of bear.	1	2	3	4	5
Being able to tell family or friends that I have been close to a black bear.	1	2	3	4	5
Getting local economic benefits from tourists who come to the region to hunt bears or see bears.	1	2	3	4	5

15. People have different levels of concern about avoiding negative situations that may result from having black bears in their area. How concerned are <u>you personally</u> about the following issues or experiences? *(Circle one response for each statement.) (1=Not at all concerned; 2=slightly concerned; 3=somewhat concerned; 4=very concerned; 5=unsure.)*

	Not at all	**Slightly**	**Some what**	**Very**	**Unsure**
Being confronted by a bear while outdoors.	1	2	3	4	5
Being injured by a bear.	1	2	3	4	5
The cost of residential property damage caused by bears.	1	2	3	4	5
Driving in areas where bears may cross roads.	1	2	3	4	5
Being injured in a motor vehicle accident that involves a bear.	1	2	3	4	5
The cost of repairing a vehicle after hitting a bear.	1	2	3	4	5
The safety of pets that may encounter a bear.	1	2	3	4	5
Contracting a disease transmitted by bears.	1	2	3	4	5
Being able to deal with potential problems that bears may cause.	1	2	3	4	5
The aggravation associated with keeping bears out of garbage containers.	1	2	3	4	5
The cost of agricultural damage (e.g., crops, livestock, bee hives) caused by bears.	1	2	3	4	5
Conflicts between neighbors over the issue of feeding bears.	1	2	3	4	5
Traffic congestion in areas where people stop their cars to watch or feed bears.	1	2	3	4	5

16. Sometimes individual bears cause problems for people. The following management options deal with individual problem bears. Each option has considerations. How strongly would you support/oppose each of the following options in the region of New York where you are most interested in bears? (*Check [✓] one response for each statement.*)

a) Instruct person with the problem to modify the environment (e.g., remove bird feeder, change garbage storage, etc.), but leave the bear alone as long as no one is injured.

Considerations – the bear is not disturbed but people must take actions to avoid problems

___ Strongly support ___ Support ___ Undecided ___ Oppose ___ Strongly oppose

b) Capture bears that repeatedly cause problems for people and release them on site, after frightening the bear (i.e., negative conditioning) so that it will avoid similar situations and people.

Considerations – may give people at the site time to remove food sources that attract bears, but the bear may cause problems elsewhere.

___ Strongly support ___ Support __ Undecided ___ Oppose ___ Strongly oppose

c) Capture bears that repeatedly cause problems for people and relocate them to a new area, after negative conditioning.

Considerations – may solve a local problem, but the relocated bear may cause problems elsewhere.

___ Strongly support ___ Support ___ Undecided ___ Oppose ___ Strongly oppose

d) Destroy bears that repeatedly cause problems for people.

Considerations – may solve a local problem, but identifying specific problem bears can be difficult, and killing bears is objectionable to some people.

__ Strongly support ___ Support ___ Undecided ___ Oppose ___ Strongly oppose

e) Use hunting seasons to lower the number of bears.

Considerations – may reduce the total number of bears and the probability of problems, but does not target specific bears.

___	Strongly support	__	Support	___	Undecided	___	Oppose	___	Strongly oppose

17. Please circle the number that represents how you would most likely respond to each of the situations described below. (*Circle one response for each situation.*)

Situation	*I would **not** contact any authorities*	*I would inform the authorities about the bear and ask what I should do*	*I would ask/tell some authority to do something about the bear*
a) A bear *repeatedly* threatens and chases pets near your home.	1	2	3
b) You see a bear near your home *more than once* a week.	1	2	3
c) A bear, unprovoked, chases a neighbor's pet *once.*	1	2	3
d) You see a bear near your home *one* morning.	1	2	3
e) A bear damages several bird feeders and garbage cans *over a week* near your home.	1	2	3
f) You see or hear a bear attempting to enter some part of your home.	1	2	3
g) A bear damages a bird feeder or garbage can near your home *once.*	1	2	3

Your Use of Newspapers

The questions in this section will help us understand whether you use newspapers as a source of information about black bear and other wildlife.

18. Do you read a daily newspaper? (C*ircle one response.*)

1 **No** → → → → → IF NO, SKIP TO QUESTION 22

2 **Yes** → → If yes, how many days per week do you read a newspaper? *(Please write in the number of days, from 0 to 7.)*

_____ **days per week**

19. What is the name of the daily paper you use the most to get news about wildlife and wildlife management issues?

Name of the paper: _____

20. On a scale of 1 to 5, how often do you read the following types of newspaper stories?

	Never read				**Read very often**	**I don't know**
Stories about wildlife	1	2	3	4	5	6
Stories about black bears	1	2	3	4	5	6
Stories about wildlife management issues	1	2	3	4	5	6

21. Apart from how often you read these types of content, on a scale of 1 to 5 how much attention do you pay to them?

	No attention at all				**Very much attention**	**I don't know**
Stories about wildlife issues	1	2	3	4	5	6
Stories about black bears	1	2	3	4	5	6
Stories about wildlife management issues	1	2	3	4	5	6

Your Beliefs About Wildlife

22. This section explores your beliefs and attitudes about wildlife in general. The following statements reflect different beliefs people have about wildlife. Please indicate the extent to which you agree or disagree with each. (*Please circle one response for each statement.*) *(1=strongly agree; 2=agree; 3=neither agree nor disagree; 4=disagree; 5=strongly disagree.)*

	SA	A	N	D	SD	DK
I notice birds and wildlife around me every day.	1	2	3	4	5	6
It is important for humans to manage wild animal populations.	1	2	3	4	5	6
An important part of my local community is the wildlife I see there from time to time.	1	2	3	4	5	6
Participation in regulated hunting makes people insensitive to suffering.	1	2	3	4	5	6
The rights of wildlife are more important than the human use of wildlife.	1	2	3	4	5	6
Having wildlife around my home is important to me.	1	2	3	4	5	6
Participation in regulated hunting is cruel and inhumane to animals.	1	2	3	4	5	6
Animals should have rights similar to the rights of humans.	1	2	3	4	5	6
I enjoy learning about wildlife.	1	2	3	4	5	6
Participation in regulated hunting helps people appreciate wildlife and natural processes.	1	2	3	4	5	6
Humans should manage wild animal populations for the benefit of all people.	1	2	3	4	5	6
It is important that we learn as much as we can about wildlife.	1	2	3	4	5	6
If wildlife populations are not in danger of extinction, we should have the opportunity to use them to add to the quality of human life.	1	2	3	4	5	6

Your Background

Please remember that all your responses are confidential

23. How many years have you lived in your current county of residence?

_____ **Years**

24. Do you own a *second* home or camp somewhere in New York State?

1 **No**

2 **Yes** → If Yes, check [✓] any regions of New York State where you own a second home or camp (*see map on inside cover for regions*.)

___ Western NY __ Northern NY __ Southeastern NY

25. Approximately how many years have you lived, or owned recreational land, where you were aware that black bears were present in the area? (*If none, write "0"*)

Approximately _____ **Years**

26. Is all or part of your income from farming?

1 **No**

2 **Yes** → If Yes, indicate which types of farming. (C*heck all that apply*.)

____ Grain

____ Livestock

____ Orchards

____ Bees

____ Other: _____

27. Which of the following best describes your overall opinion about regulated hunting? (*Circle ONE number*.)

1 In general, I approve of regulated hunting

2 In general, I DO NOT approve of regulated hunting

3 Unsure about my opinion toward regulated hunting

28. Which of the following activities do you participate in regularly? (*Please circle all that apply.*)

1 Camping

3 Wildlife viewing

4 Hiking/walking in natural areas

5 Feeding birds or other wildlife

6 Fishing

7 Hunting (other than bears)

8 Hunting black bears

9 Other outdoor recreation

29. On an average day, about how much time do you spend watching television? (*If you don't watch any television, write in "0."*)

_____ **Hours watching television**

30. What year were you born?

19 _____

31. Are you male or female?

1 Male

2 Female

32. Which best describes the area where you live? (*Circle one number.*)

1 Town/city with many neighbors

2 Outside town with scattered neighbors

3 Rural area with few neighbors

33. Please check your highest completed level of education. (*Circle one number.*)

1 Less than high school
2 Completed high school or GED
3 Vocational or trade school
4 Some college
5 Two-year degree
6 Four-year degree
7 Graduate school

Please use the space below for any additional comments you would like to make.

THANK YOU FOR YOUR TIME AND EFFORT!

To return this questionnaire, fold it in half, seal it in the enclosed postage-paid envelope, and drop it in the nearest mailbox.

Cornell University
Department of Natural Resources, Tommy Brown
PO Box DH
Ithaca, NY 14852-9953

APPENDIX B

Protocol for Nominal Group meetings (convened in fall 2001)

Black Bear Management Study
Use of Nominal Groups to Inform Questionnaire Design

Staff with the Human Dimensions Research Unit will design and implement a stakeholder survey to inform development of a statewide black bear management plan by DEC. Survey sampling and data analysis will be completed to provide information about New York State residents in 5 geographic strata (i.e., the Allegany bear hunting zone, the Adirondack bear hunting zone, the Catskill bear hunting zone, the upstate peripheral bear occupancy zone, and metropolitan areas).

One of our study objectives is to identify key impacts associated with bear and bear management (another objective is to collect information to calibrate initial decision support models for adaptive impact management [AIM]). We will use the nominal group technique (Moore 1987) with small groups of carefully selected individuals in 3 geographic locations to identify and describe bear and bear management impacts in New York State. Data collected in these small group meetings will inform development of a portion of the questionnaire that will be used in a statewide mail survey of New York State residents. DEC staff will utilize the data from that mail survey to make decisions about the statewide bear management plan.

Objectives for small group process using nominal group technique:

1. Primary objective: Identify major classes of bear and bear management impacts recognized by the people of New York State. (Information from small group meetings will allow us to verify and perhaps expand the list of impact categories recognized by the NYSDEC Bear Management Plan team. Researchers will use information from the small group meetings to make decisions about which broad classes of impacts to explore through the mail survey).

2. Secondary objective: Identify specific examples of bear and bear management impacts in the actual terms that stakeholders use to describe those impacts. (Small group meetings will provide information about impacts in the vernacular of the people concerned about those impacts. Researchers will use this information to design the wording of specific items within a bear impacts scale).

About the Small Group Meetings

Nominal Group Technique (NGT) is a structured format for small group meetings that will allow us to pool individual judgments about bear and bear management impacts. The technique is used by researchers to identify problems,

explore solutions, and establish priorities (Moore 1987). We will use it to identify impacts and prioritize impact categories for further study. Three HDRU staff (2 facilitators, 1 recorder) will take group members through a typical NGT process:

1. *Introduction:* DEC staff (e.g., Lou Berchielli) will give a very brief welcome to the group. The DEC staff person will very briefly inform participants that DEC is developing a statewide bear management plan and it needs to base that plan on the interests and concerns of the people of New York. He will inform them that a statewide mail survey is planned and that their input at the meeting will be used to help develop part of the questionnaire for that mail survey. He will thank them for their willingness to take the time to participate in the meeting and then he will turn the meeting over to HDRU facilitators.

   The introductory statement about the task for participants will be brief. HDRU staff will instruct participants to act not as stakeholder representatives, but as informants about their community. HDRU staff will give participants a relatively simple set of instructions. We will provide more information during the process if that is necessary to clarify the task, but we will not give detailed information about impacts, bear management, or the bear management planning process (past experience suggests that detailed instruction about the task may confuse rather than assist participants).

   Participants will be instructed to generate responses to the following question:

   > *Think about the people of your community and the ways that they may interact with local black bears, or with each other because black bear are present. Then, answer these questions:*
   >
   > - *What positive things do people want gain from the bear in your community?*
   >
   >   - *What outcomes or interactions do people want to obtain? What interests people about bear? What benefits do people hope to derive?*
   >
   > - *What negative things do people want to avoid?*
   >
   >   - *What outcomes or interactions do people want to obtain? What concerns people about bear? What costs do they want to avoid?*

2. *Silent generation of ideas in writing:* HDRU facilitators will ask participants to spend 10-15 minutes working silently and independently to generate a list of bear and bear management impacts.

3. *Round-robin recording of ideas in writing:* Participants will be seated in a semi-circle with HDRU facilitators and an HDRU recorder in front of them. A facilitator will call upon individual participants in succession. A facilitator will ask a participant to read aloud a single impact statement from their written list. The HDRU recorder will write that statement on a large flip-chart displayed in front of the group. After the statement is recorded on the flip-chart, the facilitator will move on to the next individual and repeat the process. Group discussion of the statements will not be allowed at this point, however, as needed the facilitators will probe for clarification of statements as they are offered. The HDRU recorder will tape completed flip-chart sheets to the wall so that all statements can be seen by participants. An HDRU facilitator will continue to call on members of the group until all ideas are exhausted.

4. *Serial discussion of ideas:* The HDRU facilitators will help the group members discuss each idea on the list so that the meaning of all statements is clear to everyone.

5. *Ranking:* The group members will identify what each of them believes are the most important impacts in their communities, by assigning a ranking to what they believe are the 5 most important impacts (ranked 1-5). HDRU staff will tally the rankings and lead a brief discussion on the results.

HDRU and DEC responsibilities:

HDRU staff will have primary responsibility for forming the nominal groups and implementing the nominal group meetings. We will work with DEC and CCE staff to assist with identification of meeting participants. DEC staff (e.g., Berchielli) will assist at each meeting by providing a brief overview presentation on development of the bear management plan. DEC staff will assist with arranging a meeting place for all 3 meetings.

This work will be funded primarily through an existing HATCH project administered by Dan Decker. Some involvement by HDRU staff will be paid for using existing DEC support. HATCH funding will cover some salary and M & O costs. DEC will be asked to cover expenses for the meal/refreshments provided to participants, as well as any participant stipends or reimbursements for travel costs. DEC costs may be covered using dollars previously budgeted by the bear team to conduct outreach activities.

Meeting format:

All three meetings will follow a similar format. The meetings will be held on evenings or weekends to accommodate the participants. Meeting places will be selected to minimize travel distance for meeting participants. DEC will offer to reimburse participants for travel expenses in order to reduce financial barriers to

participation. Each meeting will begin informally, with a complementary meal or refreshment session. After the meal/refreshment, a DEC staff person will provide a brief introduction welcoming participants and clarifying the purpose of the group meeting. The brief overview will be followed by a nominal group session lasting approximately 60 minutes.

Meeting follow-up:

Nominal group members will be re-contacted after the meeting, to pretest that portion of the black bear management questionnaire that deals with impacts. HDRU staff will use the pretest data to finalize the scale(s) used to assess impacts.

Selection of Meeting Participants

We will convene 7-9 individuals for each nominal group session. Many of the impacts salient particular stakeholder groups (e.g., bee keepers, hunters) have already been identified through previous conceptual work by the bear team. For that reason, we will not seek out stakeholder representatives for the nominal group meetings. Rather, we will seek out participants who can serve as informants about the broad range of impacts recognized in one or more geographic communities in the study areas. We will seek out individuals who can serve as informants about a range of communities (e.g., villages, towns, or counties) that have different capacities with regard to their ability to benefit from bear or bear management, and their exposure to negative impacts from bear and bear management. We will select participants from areas that inside and outside current bear hunting zones. Selecting participants from different types of communities will improve our odds of detecting new categories of impacts. We will seek out the following types of participants:

- Community leaders identified by CCE staff
- County agency personnel
- Planning department staff
- Members of Environmental Management Councils
- County CCE staff
- Town supervisors
- Members of Chambers of Commerce
- County commissioners

Development of nominal group question

The question guiding nominal group sessions should be as simple as possible but should elicit items at the desired level of specificity and abstraction to be of use in development of the questionnaire. The draft question (described above) will be pilot-tested in a two “mock” nominal group sessions to be held in advance of the three meetings with study participants.

Timeline for Key Tasks

- Identify meeting sites, make meeting place and meal arrangements (September – October 2001).

- Identify 7-9 participants for small groups (3 groups in all) that will each meet one time to identify black bear and black bear management impacts (September 2001).

- Hold mock meetings to finalize the question posed to meeting participants and train HDRU staff (September 2001).

- Meet once with each of the 3 small groups to complete a nominal group process (i.e., complete 1 session in each stratum and one statewide session, for a total of 5 nominal groups) (October – November 2001).

- Analyze and synthesize findings from nominal group meetings and use that information to inform questionnaire design (i.e., to identify a list of impacts to explore through the black bear management survey) (December 2001).

- Pretest questionnaire with study advisory committee (December - January 2002).

- Finalize questionnaire for black bear management survey (February 2002)

Staff:

Dan Decker, Principal Investigator
Tania Schusler, Research Assistant
Bill Siemer, Research Specialist
Karlene Smith, Research Aide

Literature Cited

Moore, C. M. 1987. Group Techniques for idea building. Applied Social Science Research Methods Series Volume 9. Sage Publications. Newbury Park, California. 143pp.

APPENDIX C

Nonrespondent-respondent comparisons; 2002 bear management stakeholder survey

Table 1. Comparisons of March 2002 mail survey respondents and nonrespondents, and September 2002 telephone survey respondents.

			Response	
		n	Yes	No
Have you ever seen a wild black bear anywhere, not just in NY state?	Respondents	1,036	67.6	32.4
	Nonrespondents	75	46.7	53.3
		n	Positive	Negative
Was seeing a black bear a positive or negative experience?	Respondents	679	95.3	4.7
	Nonrespondents	34	88.2	11.8
		n	Yes	No
Have you ever had property damaged by a black bear?	Respondents	1,037	8.5	91.5
	Nonrespondents	75	5.3	94.7
	2002 tel survey	304	5.9	94.1
		n	Yes	No
Have you ever had a pet threatened by a black bear?	Respondents	1,037	1.1	98.9
	Nonrespondents	75	1.3	98.7
	2002 tel survey	304	12.5	87.5
		n	Female	Male
Gender	Respondents	1,012	37.9	62.1
	Nonrespondents	75	49.3	50.7
	2002 tel survey	302	50.3	49.7
		n	Yes	No
Participate in wildlife viewing	Respondents	1,005	56.0	
	Nonrespondents	75	45.9	
		n	Yes	No
Participate in wldlife feeding	Respondents	1,005	51.6	
	Nonrespondents	75	61.3	
		n	Yes	No
Participate in fishing	Respondents	1,005	39.9	
	Nonrespondents	75	21.3	
		n	Yes	No
Participate in hunting	Respondents	1,005	25.5	
	Nonrespondents	75	14.7	

Table 2. Comparisons of March 2002 mail survey respondents and nonrespondents, and September 2002 telephone survey respondents.

		Response categories				
Personal level of interest in black bears in New York	n	None	Low	Mod	High	Unsure
Respondents	1,009	12.4	15.9	43.2	26.1	2.5
Nonrespond.	75	16.0	28.0	38.7	10.7	6.7
I enjoy having black bears in New York State	n	Agree	Disagree	Neutral	No opinion	Don't know
Respondents	1,016	71.5	3.8	24.8		
Nonrespond.	75	52.0	14.7	21.3	12.0	
I worry about problems that bears may cause in NY	n	Agree	Disagree	Neutral	No opinion	Don't know
Respondents	1,008	31.7	34.0	34.3		
Nonrespond.	75	48.0	34.7	10.7	5.3	1.3
DEC should be more willing to capture and relocate bears in urban areas than in rural areas	n	Agree	Disagree	Neutral	No opinion	Don't know
Respondents	1,037	82.6	7.5	9.9		
Nonrespond.	75	65.3	12.0	10.7	10.7	1.3
DEC should be more willing to destroy bears in urban areas than in rural areas	n	Agree	Disagree	Neutral	No opinion	Don't know
Respondents	1,037	15.8	66.5	17.8		
Nonrespond.	75	14.7	80.0	4.0	1.3	
Highest level of education	n	< High school	High school	Tech/voc school	College degree	Advanced degree
Respondents	1,004	4.2	24.0	5.9	46.7	19.2
Nonrespond.	74	10.8	51.4	14.9	13.5	9.5

Table 3. Comparisons of March 2002 mail survey respondents and nonrespondents, and September 2002 telephone survey respondents.

		Attitude toward proposal			
Opinion toward expanding size of bear hunting zone in western New York	n	Support	Oppose	Undecided	Don't know
Respondents	915	36.1	28.6	35.2	
Nonrespond.	75	38.7	26.7	34.7	
Opinion toward expanding size of bear hunting zone in southeastern New York	n	Agree	Disagree	Neutral	No opinion
Respondents	906	34.6	29.7	35.8	
Nonrespond.	75	37.3	26.7	34.7	

Table 4. Comparisons of March 2002 mail survey respondents and nonrespondents, and September 2002 telephone survey respondents.

		Response categories		
Overall opinion toward about regulated hunting	n	Approve	Disapprove	Unsure
Respondents	1,023	75.1	10.6	14.4
Nonrespondents	75	61.3	16.0	22.7
Best description of the area where you live	n	Town/city	Outside town	Rural
Respondents	1,002	50.3	33.9	15.8
Nonrespondents	75	60.0	26.7	13.3

Table 5. Proportion of 2002 mail survey respondents and nonrespondents who expressed an interest in black bears.

		2002 mail survey	
		Respondents (n=1,009)	Non respondents (n=75)
How would you describe your level of personal interest in black bears in New York?	No interest	12.4	16.0
	Low	15.9	28.0
	Moderate	43.2	38.7
	High	26.1	10.7
	Unsure	2.5	6.7

Table 6. Proportion of 2002 mail survey respondents and nonrespondents who had seen a bear who enjoy having black bears in New York.

		2002 mail survey	
		Respondents (n=1,016)	Non respondents (n=75)
I enjoy having black bears in New York State.	Agree	71.5	52.0
	Disagree	3.8	14.7
	Neutral	24.8	21.3
	No Opinion		12.0
	Don't know		

Table 7. Proportion of 2002 mail survey respondents and nonrespondents who worry about problems that black bears may cause.

		2002 mail survey	
		Respondents (n=1,008)	Non respondents (n=75)
I worry about problems that black bears may cause in New York State.	Agree	31.7	48.0
	Disagree	34.0	34.7
	Neutral	34.3	10.7
	No Opinion		5.3
	Don't know		1.3

Table 8. Proportion of 2002 mail survey respondents and nonrespondents who thought DEC should be more willing to capture and relocate black bears in urban areas than in rural areas.

		2002 mail survey	
		Respondents (n=1,037)	Non respondents (n=75)
DEC should be more willing to capture and relocate black bears in urban areas than in rural areas.	Agree	82.6	65.3
	Disagree	7.5	12.0
	Neutral	9.9	10.7
	No Opinion		10.7
	Don't know		1.3

Table 9. Proportion of 2002 mail survey respondents and nonrespondents who thought DEC should be more willing to destroy black bears in urban areas than in rural areas.

		2002 mail survey	
		Respondents (n=1,037)	Non respondents (n=75)
DEC should be more willing to destroy black bears in urban areas than in rural areas.	Agree	15.8	14.7
	Disagree	66.5	80.0
	Neutral	17.8	4.0
	No Opinion		1.3
	Don't know		

Table 10. Proportion of 2002 mail survey respondents and nonrespondents who would support or oppose expansion of the bear hunting zone in western New York.

		2002 mail survey	
Would you support, oppose or be undecided about a proposal to expand the size of the area where bear hunting is permitted in Western New York?		Respondents (n=915)	Non respondents (n=75)
	Support	36.1	38.7
	Oppose	28.6	26.7
	Undecided	35.2	34.7
	Don't know		

Table 11. Proportion of 2002 mail survey respondents and nonrespondents who would support or oppose expansion of the bear hunting zone in southeastern New York.

		2002 mail survey	
Would you support, oppose or be undecided about a proposal to expand the size of the area where bear hunting is permitted in southeastern New York?		Respondents (n=906)	Non respondents (n=75)
	Support	34.6	37.3
	Oppose	29.7	26.7
	Undecided	35.8	34.7
	Don't know		1.3

Table 12. Proportion of 2002 mail survey respondents and nonrespondents who would approve or disapprove hunting regulated hunting.

		2002 mail survey	
Which of the following best describes your overall opinion about regulated hunting?		Respondents (n=1,023)	Non respondents (n=75)
	Approve	75.1	61.3
	Disapprove	10.6	16.0
	Unsure	14.4	22.7

Table 13. Proportion of 2002 mail survey respondents and nonrespondents who participate in wildlife-related activities.

	2002 mail survey	
	Respondents (n=1005)	Non respondents (n=75)
Wildlife viewing	56.0	45.9
Feeding birds or other wildlife	51.6	61.3
Fishing	39.9	21.3
Hunting	25.5	14.7

Table 14. A comparison of 2002 mail survey respondents and nonrespondents by residence area.

		2002 mail survey	
		Respondents (n=1,002)	Non respondents (n=75)
Which best describes the area where you live?	Town/city with many neighbors	50.3	60.0
	Outside town, scattered neighbors	33.9	26.7
	Rural, few neighbors	15.8	13.3

Table 15. A comparison of 2002 mail survey respondents and nonrespondents by education.

		2002 mail survey		
		Respondents (n=1,004)	Non respondents (n=74)	Telephone survey
Highest level of education	Less than high school	4.2	10.8	
	High school or GED	24.0	51.4	
	Tech or Voc school	5.9	14.9	
	College degree	46.7	13.5	
	Grad or prof degree	19.2	9.5	

APPENDIX D

Protocol for structure of stakeholder input group (SIG) process meetings.

Table D.1. Content and tasks associated with black bear stakeholder input group (SIG) meeting 1, fall 2003.

Meeting 1 Content	Tasks before Meeting 1	Tasks during Meeting 1
Meeting 1: Introductions, overview of the planning framework, overview of the SIG process (20 minutes) DEC presentation on bear biology, populations, harvest, nuisance loads, legislation, etc. (20-30 minutes) Questions (15-20 minutes) Brief introduction to the impacts concept (15-20 minutes) Questions (10-15 minutes) Next steps (10 –15 minutes) Documents needed: Framework document, SIG process description, Natural History document, Executive Summary of survey results, etc.	**CCE staff**: --Contract with DEC --CCETC ID local educators --ID and contact participants --Communicate re: process and expectations of local educators and participants --Meeting arrangements --Prepare participant notebooks; mail necessary documents, etc. **DEC staff:** --Post documents on DEC website --Synthesize information about bear complaints, harvest, etc. --Prepare Powerpoint presentation **HDRU staff:** --Finalize HDRU impacts document --Prepare Powerpoint presentation **Participants:** --Read framework, natural history and process overview documents	**CCE staff:** Introduces group members to one another, provides an overview of the planning framework document and the SIG process. Ensures meeting documented (minutes and/or tape recording). Incorporates formative evaluation. **DEC staff:** Present information on biology, bear populations, human interactions with bears, and bear management (e.g., bear harvest, legislation, etc.). **HDRU staff:** Brief introduction to the impacts concept; instructions that participants go home and think about what impacts are important in their region. **Participants:** Listen and ask questions during this meeting. After meeting 1, solicit input from stakeholders.

Table D.2. Content and tasks associated with black bear stakeholder input group (SIG) meeting 2, fall 2003.

Meeting 2 Content	Tasks before Meeting 2	Tasks during Meeting 2
Meeting 2: Housekeeping announcements, overview of the meeting agenda (10 minutes) Presentation on current understanding of impacts in New York (20-30 minutes) Group discussion that refines understanding of location-specific impacts, including the potential to identify additional impacts (30-45 minutes) Process by which the group produces a list of prioritized impacts and fundamental objectives associated with those impacts (20-30 minutes)	**CCE staff**: --Meeting arrangements --Communication with SIG participants **DEC staff:** --No prep work anticipated **HDRU staff:** --Prepare to present survey findings related to impacts **Participants:** --Read HDRU impacts document --Interact with stakeholders to gain input on impacts	**CCE staff:** Get the meeting started; housekeeping announcements, overview of the meeting agenda. Facilitate group consideration of the range of impacts and perhaps identify additional impacts. Lead a process by which the group articulates and prioritizes important impacts in their region/locality (each SIG will be given a defined geographic area to consider). **DEC staff:** Observe and answer questions about bears or bear management as necessary. **HDRU staff:** Present information about the impacts concept and understanding of impacts in New York. **Participants:** Engage in group discussion and group decision making. Produce a list of prioritized impacts and fundamental objectives associated with those impacts.

Table D.3. Content and tasks associated with black bear stakeholder input group (SIG) meeting 3, fall 2003.

Meeting 3 Content	Tasks before Meeting 3	Tasks during Meeting 3
Meeting 3: Housekeeping announcements. (10 minutes). Discussion and deliberation about impacts, in a process by which participants provide information on ends-means connections for just the highest priority impacts. (90-120 minutes)	**CCE staff**: --Meeting arrangements --Communication with SIG participants **DEC staff:** --Prepare to address questions / comments raised in Meeting 2. **HDRU staff:** --Prepare to address questions / comments raised in Meeting 2. **Participants:** --Complete assignment to think about enabling objectives to achieve identified fundamental objectives. --Talk to people in their stakeholder group to get input on fundamental and enabling objectives.	**CCE staff:** Get the meeting started, housekeeping announcements. Facilitate discussion and deliberation, administer a process by which participants provide information on ends-means connections for a given impact or impacts. CCE facilitator lays out the tasks for to be completed and how the tasks will be completed. Facilitator will clarify that the group will work on just the highest priority impacts or form breakout groups to address more impacts. Estimated time: 90-120 minutes. **DEC staff:** Serve as technical advisor when questions arise about understanding of black bears, black bear management, regulations and procedures, agency capacities, or stakeholders. **HDRU staff:** Serve as technical advisor when questions arise about understanding of stakeholders. **Participants:** This meeting will require the greatest amount of thought, effort, and discussion from participants.

APPENDIX E

Example of self-administered mail questionnaire used to assess outcomes of stakeholder input group (SIG) processes

Black Bear Stakeholder Input Group (SIG) Process

Evaluation by participants in the East of Hudson SIG

This questionnaire provides you with an opportunity to tell us about your experiences as a participant in the stakeholder input group convened this year to discuss black bear management issues in Washington, Rensselaer, and Columbia counties. It seeks your opinions about the structure, quality, and usefulness of the process for your area. It also solicits your suggestions for improving future input processes. This evaluation is sponsored by the New York State Department of Environmental Conservation (DEC). DEC staff will use the information provided in this questionnaire to improve the way they obtain input about black bear management in the future.

Your participation in this evaluation is voluntary. We invite you to complete this questionnaire and answer the questions as best as you can. Thank you for your assistance!

Section 1: Your level of participation in the process

1. Which meetings did you attend? *(Check all that apply.)*

_____ Meeting 1 (April 22, 2006)

_____ Meeting 2 (May 10, 2006)

2. About how many people did you contact to discuss black bear impacts between meetings? *(Check all that apply.)*

_____ None

_____ 1 – 10 people

_____ 11-25 people

_____ More than 25 people

Section 2: The impacts concept

Our meeting discussions focused on the concept of "impacts" (i.e., important positive and negative effects produced by interactions between people, bears, and the land). The following questions seek your opinions about the clarity and usefulness of that concept.

3. What is your opinion about the impacts concept and its usefulness for discussion? *(Circle the number between each pair of statements that best represents your opinion.)*

As described by process staff, the impacts concept was …

Clear	1	2	3	4	5	Unclear
Useful for discussion purposes	1	2	3	4	5	Not useful for discussion purposes

4. What is your opinion about the way that the impacts concept was described in *A Framework for Black Bear Management in New York*? *(Circle the number between each pair of statements that best represents your opinion. Circle "6" if you did not read the framework document.)*

As described in the *Framework* document, the impacts concept was …

							I did not read the document
Clear	1	2	3	4	5	Unclear	6
Useful for discussion purposes	1	2	3	4	5	Not useful for discussion purposes	6

Section 3: Importance of the impacts discussed by your group

The following questions contain statements about the three impacts that the group identified as priorities for management attention **in Washington, Rensselaer, and Columbia counties.** Please answer all remaining questions with that three-county area in mind.

Please circle the number that best reflects your agreement or disagreement with each statement.

5. "Habitat changes that affect long-term viability of black bears in New York." *(Circle one response for each statement.)*

		Strongly agree	agree	Neither	disagree	Strongly disagree
a.	It is important for DEC to manage this impact in our area.	1	2	3	4	5
b.	Failing to address this impact would have serious implications for residents in our area.	1	2	3	4	5
c.	It was important to <u>me</u> that the input group focus attention on this impact.	1	2	3	4	5

6. "Level of understanding about the natural world" *(Circle one response for each statement.)*

		Strongly agree	agree	Neither	disagree	Strongly disagree
a.	It is important for DEC to manage this impact in our area.	1	2	3	4	5
b.	Failing to address this impact would have serious implications for residents in our area.	1	2	3	4	5
c.	It was important to <u>me</u> that the input group focus attention on this impact.	1	2	3	4	5

7. "Cost of bear-related damage to commercial property, specifically damage to bee hives, corn, and apples. *(Circle one response for each statement.)*

		Strongly agree	agree	Neither	disagree	Strongly disagree
a.	It is important for DEC to manage this impact in our area.	1	2	3	4	5
b.	Failing to address this impact would have serious implications for residents in our area.	1	2	3	4	5
c.	It was important to me that the group focus attention on this impact.	1	2	3	4	5

Section 4: Quality of the process used to discuss impacts

8. The following questions contain statements about the quality of the process used to identify and prioritize impacts, and to discuss actions that might be taken to manage those impacts. *(Circle one response for each statement.)(1=strongly agree; 2=agree; 3=neither; 4=disagree; 5=strongly disagree)*

		SA	A	N	D	SD
a.	Communication between participants was clear and understandable.	1	2	3	4	5
b.	Communication between participants and DEC staff was clear and understandable.	1	2	3	4	5
c.	Communication between participants and Cornell University staff was clear and understandable.	1	2	3	4	5
d.	Everyone in the group had a chance to voice their opinions.	1	2	3	4	5
e.	There was ample opportunity to discuss points where people had divergent opinions.	1	2	3	4	5
f.	The process helped us focus on priorities for black bear management.	1	2	3	4	5

g.	The process included people with diverse opinions on bear management.	1	2	3	4	5
h.	It was clear to me how DEC intends to use input from the stakeholder group.	1	2	3	4	5

Section 5: Results of the input group process

9. The following questions focus on what if any effects the process had on you and other members of the input group. Please think about the interactions you had with process participants, process facilitators, and the people who gave you feedback between input group meetings, and then answer the following questions. *(Circle one response for each statement.)*

The input group process . . .	Strongly agree	agree	Neither	disagree	Strongly disagree
a. Increased my understanding of the priority effects (impacts) we discussed in our meetings.	1	2	3	4	5
b. Improved my understanding of the opinions of the other participants.	1	2	3	4	5
c. Increased my level of trust in DEC as an agency.	1	2	3	4	5
d. Gave me insight into the possibilities for managing impacts.	1	2	3	4	5
e. Was an efficient way to get input for DEC decisions about black bear management.	1	2	3	4	5

10. Take a moment to reflect on the discussions that took place in your input group meetings, and the communication that you engaged in between group meetings. Then, please indicate your agreement or disagreement with the following statements. *(Circle one response for each statement.)*

		Strongly agree	agree	Neither	disagree	Strongly disagree
a.	I learned more about the ways that black bears impact people.	1	2	3	4	5
b.	My *group* gained insight about the ways that black bears affect people.	1	2	3	4	5
c.	This process required participants to consider a broader range of viewpoints than they would have otherwise.	1	2	3	4	5
d.	This process helped participants form a shared vision of priorities for black bear management in our area (Washington, Rensselaer, and Columbia counties).	1	2	3	4	5
e.	The group considered management <u>problems</u> that I would not have considered otherwise.	1	2	3	4	5
f.	The group considered management <u>action alternatives</u> that I would not have considered otherwise.	1	2	3	4	5

Section 6: Quality of the Input Group Process

11. The purpose of the input process was to help DEC refine their understanding of key impacts in your region and consider relationships between management strategies and desired outcomes. Please indicate whether you think the process achieved these purposes.

How would you rate the stakeholder input process on the following:	Very poor	poor	good	Very good	Not sure
a. As a way to clarify how bears affect people in our area.	1	2	3	4	5
b. As a way to identify which effects matter most to people in our area.	1	2	3	4	5
c. As a way to stimulate thinking about what might be the best management strategies (means) to achieve desired outcomes (ends) in our area.	1	2	3	4	5
d. As a source of input DEC staff can use to set area-specific management objectives and plans of action.	1	2	3	4	5

12. The following questions focus on the quality of the input process as a way to discuss impacts that matter most to residents of Washington, Rensselaer, and Columbia counties *(Circle one response for each statement.)*

	Strongly agree	agree	Neither	disagree	Strongly disagree
a. There was adequate opportunity for open and extensive discussion.	1	2	3	4	5
b. All the impacts that need attention in our area were discussed.	1	2	3	4	5
c. A broad range of useful solutions were discussed.	1	2	3	4	5
d. In the process the pros and cons of possible solutions were attended to.	1	2	3	4	5
e. The actions that participants suggested to manage key impacts were based on sound arguments.	1	2	3	4	5

Part 7: Suggestions for future sessions

The following questions can be of great use in planning future input group processes.

13. Which of the following meeting formats do you think would be most useful if DEC convenes an input group like this in the future?

_____ Keep the meeting format about the same (2 meetings: 1 Saturday session followed by a weekday evening session)
_____ Meet for evening sessions (3 meetings on weekday evenings)
_____ Meet for two half-day weekend sessions, which would allow time for gathering input from others between meetings.
_____ Meet for a weekend workshop (an overnight meeting; food and lodging provided free) that allows for more interaction and discussion among group members.
_____ (unsure)

14. What were the best features of your input group meetings?

a) _____
_____

b) _____
_____

15. What were the most disappointing features or problems of the input group meetings?

a) _____
_____

b) _____
_____

16. What specific suggestions would you make if input group meetings like these were to be organized or held again?

a) _____
_____

b) _____
_____

THANK YOU AGAIN FOR YOUR TIME AND EFFORT!

(Feel free to offer any additional comments below)

To return this questionnaire, fold it in half, seal it in the enclosed postage-paid envelope, and drop it in the nearest mailbox.

If you misplace your postage-paid envelope,
just use your own envelope and return to:

Bill Siemer
119 Fernow Hall, Department of Natural Resources,
Cornell UniversityIthaca, NY 14852-9953

APPENDIX F

Media Content Analysis Codebook

SPSS CODING SHEET FOR BLACK BEAR NEWSPAPER ARTICLES (March 2006 SPSS Code Sheet)

Coder: _____

[V1] Article number :_____ **Title:**

Section 1A: Article Description

[V2] Name of publication/transcript: _____

[V3] Publication date: month _____

[V4] Publication date: day _____

[V5] Publication date: year _____

[V6] Article/story title: _____

[V7] Page number (s) _____

[V8] Section: _____

[V9] Desk: _____

[V10] Number of Paragraphs: _____

[V11] Article type (e.g., news, editorial,letter to editor):_____

[V12] Article bear related? _____

[V13] Spokesperson: _____

[V14] Topic discussed (#1) _____

[V15] Topic discussed (#2) _____

[V16] Topics discussed (#) _____

Section 2A: Location

[V13] National _____
[V14] NYC metro area _____
[V15] Catskill region _____
[B16] Allegany region _____
[V17] Adirondack region _____
[V18] New Jersey _____
[17] Other states _____

Section 2B: Effects and Interactions

Economic: does the article mention . . .

[V26] Bear-related damage to commercial property? **1 = Yes 0 = No**

[V27] Bear-related damage to residential property? **1 = Yes 0 = No**

[V28] Economic activity associated with bear hunting, viewing, photography? **1 = Yes 0 = No**

Health and safety: does the article mention . . .

[V29] human injuries or deaths caused by black bears? **1 = Yes 0 = No**

[V30] pet injuries or deaths caused by black bears? **1 = Yes 0 = No**

Psychological: does the article mention . . .

[V31] satisfactions produced by bear hunting, viewing, photography? **1 = Yes 0 = No**

[V32] Frustration or anger about commercial property damage? **1 = Yes 0 = No**

[V33] Frustration or anger about residential property damage? **1 = Yes 0 = No**

[V34] Worry or fear about human injuries caused by bears? **1 = Yes 0 = No**

[V35] Complaints people are making about bears to a govt. agency? **1 = Yes 0 = No**

Social: does the article mention . . .

[V36] someone who expressed an interest in learning about bears **1 = Yes 0 = No**

[V37] someone who thinks we need to teach people about bears **1 = Yes 0 = No**

Ecological: does the article mention . . .

[V38] concern about low bear population (maintaining a viable population) **1 = Yes 0 = No**

[V39] effects black bears may have on other wildlife (predation, etc.) **1 = Yes 0 = No**

Management: does the article mention . . .

[V40] public reaction to hunting? **1 = Yes 0 = No**

[V41] public reaction to management of individual problem bears? **1 = Yes 0 = No**

[V42] the phrase "animal rights?" **1 = Yes 0 = No**

Section 2B: Problem Attribution

Does the article suggest that problems with bears are occurring because . . .

[V43] the number of bears is increasing? **1 = Yes 0 =No**

[V44] bears are expanding their range? **1 = Yes 0 =No**

[V45] bears are coming into populated areas like towns, villages, residential neighborhoods? **1 = Yes 0 =No**

[V46] people are encroaching on bear habitat? **1 = Yes 0 =No**

[V47] people fail to take actions to prevent problems? **1 = Yes 0 =No**

[V48] bears are being attracted to human food? **1= Yes 0 =No**

[V49] bears have become habituated to human food? **1= Yes 0 =No**

[V50] bear hunting is absent or too limited to control the number of bears **1 = Yes 0 =No**

Section 2C: Assigning Blame

Does the article state that a problem with bears may exist because of actions by . . .

[V52] individual people (do not include interest groups or NGO's) **1 = Yes 0 = No**

[V53] a state wildlife management agency (NYSDEC, Bureau of Wildlife) **1 = Yes 0 = No**

[V54] another government agency (e.g., town govt., police) **1 = Yes 0 = No**

Section 2D: Trust

[V55] Is credibility of a state wildlife agency questioned? **1 = Yes 0 = No**

[V56] **Is** credibility of a local government agency questioned? **1 = Yes 0 = No**

Section 3A: Solution Frame

Does the article suggest that problems with bears be addressed by . . .

[V57] taking no action **1 = Yes 0 = No**

[V58] establishing or increasing bear hunting **1 = Yes 0 = No**

[V59] trapping and moving bears **1 = Yes 0 = No**

[V60] negatively conditioning bears **1 = Yes 0 = No**

[V61] lethal control of individual problem bears **1 = Yes 0 = No**

[V62] teaching people how to live with bears **1 = Yes 0 = No**

[V63] better waste disposal practices **1 = Yes 0 = No**

Attributions of responsibility

Does the article include statements suggesting that:

[V64] an individual <u>is</u> taking responsibility or someone in the article is suggesting that individuals should take responsibility? **1 = Yes 0 = No**

(don't include private organizations here, just individual people)

[V65] a state wildlife management agency <u>is</u> taking responsibility Or someone in the article is suggesting they <u>should</u> take responsibility? **1 = Yes 0 = No**

[V66] some other government agency <u>is</u> taking responsibility or someone in the article is suggesting they <u>should</u> take responsibility? **1 = Yes 0 = No**

(a town, village, local police agency, legislature, governor)

(*Description of some action indicates that someone is taking responsibility. Assertions about what ought to be done are evidence that should someone thinks individuals or government agencies should be taking some action.)

Section 4B: Risk Information

[V82] Is a probability of threats/attacks discussed? **1 = Yes 0 = No**

[V83] Are attitudes toward risk of threats/attacks discussed? **1 = Yes 0 = No**

[V84] Does anyone in the article make statements indicating that they find the level of bear-related risk acceptable? **1 = Yes 0 = No**

[V85] Does anyone in the article make statements indicating that they find the level of bear-related risk unacceptable? **1 = Yes 0 = No**

Section 5A: News frame/format

[V86] Is an episodic frame used? **1 = Yes 0 = No**

Indicators: The story focuses on a specific event or a specific case.

It may be presented as a human interest story.

[V87] Is a thematic frame used? **1 = Yes 0 = No**

Indicators: The story focuses on general conditions or outcomes. An event may be discussed, but that event is placed in a general context. The piece discusses policies or history.

[V88] If both frames are used, which is predominant?

1 = Episodic

2 = Thematic

3 = Mixed - both frames present in about equal measure

(Indicators: Mark paragraphs as predominantly episodic (E) or thematic (T). The dominant frame is the one discussed in the greatest number of paragraphs. If counting paragraphs does not determine a dominant frame, use the title as the "tie-breaker" to determine whether to choose episodic or thematic. If title doesn't help you make a decision, label the frame as "mixed."

APPENDIX G

Pre-simulation GMB questionnaire2005 Group Model Building Activity on Black Bear Management

Assessment of Your Views Prior to Model Simulation Workshop

This form is designed to document a few of your beliefs and attitudes about the bear management actions being discussed in this project. It is useful to put this down in writing before simulating system behavior. Together with follow-up interviews, the information you provide here will help us understand whether developing and using a simulation led to any changes in the way Bear Team members think about managing residential problems with black bears.

The information you provide here will be analyzed qualitatively and will be used mainly for discussion purposes within the Bear Team. I've asked you to put your name on this form to facilitate analysis, but your name will not be associated with your responses in summary reports about this project.

Please answer the questions at your earliest convenience and return your response to Bill Siemer by regular mail, email, or at the next group model building workshop in Albany on March 22. Thank you!

Our Problem Statement and Management Questions

The Bear Team decided to focus this project on understanding why negative human-bear interactions have been increasing in residential areas of New York. In the remainder of the project we will discuss three management actions that could be used to reduce negative human-bear interactions in residential areas. The actions include: changing hunting season dates (in the Catskill or Allegany areas), expanding areas open to bear hunting, and increasing bear problem prevention education. The questions in the following section assess your personal opinions about this problem and your expectations about hunting and education as management responses to this problem.

The problem: Negative human-bear interactions are increasing in residential areas of New York State.

Management questions: Can BOW manage this problem by changing bear hunting regulations or increasing prevention education?

Section 1: Background information

Name: _____

Which of the GMB activities did you participated in last year? *(Check all that apply.)*

_____ Workshop 1, held March 23, 2004 (Siemer and Otto met with the Bear Team at University at Albany)

_____ Workshop 2, held May 20, 2004 (Siemer and Otto met with the Bear Team at University at Albany)

Section 2: Urgency of the problem

The following questions address your opinions on the urgency of the problem stated above. For each item, circle the response that best represents your opinion (1=Strongly Agree, 2=Agree, 3 = Neither, 4=Disagree, 5=Strongly Disagree).

The problem: An increase in negative human-bear interactions in residential areas.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
In my work I often deal with the consequences of this problem.	1	2	3	4	5
Managing this problem is important to me personally.	1	2	3	4	5
This is a problem that can have serious consequences for BOW if left unresolved.	1	2	3	4	5
It is important for BOW to focus attention on this problem.	1	2	3	4	5

4. What would you like BOW to achieve with regard to the problem over the next 5 years?

_____

_____

_____

_____

Section 3: Your opinions on the management actions being discussed

The next few questions are asked to record how you expect three management actions to influence effects that the Bear Team has identified as important.

5. As someone with responsibility for bear management in New York, what is your evaluation of the following things? *(Circle one response for each statement.)*

An increase in [a,b,c,d] would be . . .	Very good	Good	Neither Bad nor Good	Bad	Very bad
a. The rate of negative human-bear interactions in residential areas	1	2	3	4	5
b. Public concern about bear problems in residential areas	1	2	3	4	5
c. Intolerance to bear problems in residential areas	1	2	3	4	5
d. Complaints about bear problems in residential areas	1	2	3	4	5

6. How <u>likely</u> is it that the following outcomes will occur in New York over the next five years? *(Circle one response for each statement.)*

Over the next 5 years:	Very Likely	Likely	Neither	Unlikely	Very unlikely
a. The rate of negative human-bear <u>interactions</u> in residential areas will increase	1	2	3	4	5
b. Public <u>concern</u> about bear problems in residential areas will increase	1	2	3	4	5
c. <u>Intolerance</u> to bear problems in residential areas will increase	1	2	3	4	5
d. <u>Complaints</u> about bear problems in residential areas will increase	1	2	3	4	5

7. How <u>important</u> is it for BOW to achieve the following outcomes? *(Circle one response for each statement.)*

Achieving [a,b,c,d] is:	Not at all important	Slightly Important	Moderately important	Very important	Extremely important
a. <u>Reducing the frequency</u> of negative human-bear interactions	1	2	3	4	5
b. <u>Reducing concern</u> about bear problems	1	2	3	4	5
c. <u>Increasing tolerance</u> for bear problems	1	2	3	4	5
d. <u>Reducing complaints</u> about bear problems	1	2	3	4	5

8. How would you expect the following things to change if BOW opens black bear hunting seasons earlier in the Catskill and Allegany areas? *(Circle one response for each statement.)*

If the Catskill and Allegany bear hunting seasons are opened earlier:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

9. How would you expect the following things to change if BOW expands the areas open to black bear hunting? *(Circle one response for each statement.)*

If more areas are opened to hunting:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

10. How would you expect the following things to change if BOW invests more resources in problem prevention education? *(Circle one response for each statement.)*

If BOW puts more effort into prevention education:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

11. Considering all the outcomes that might be produced, do you regard the following management actions as beneficial or harmful? *(Circle one response for each statement.)*

Considering all the outcomes that might occur,	Very harmful	Harmful	Neither	Beneficial	Very beneficial
a. opening southern zone bear hunting seasons earlier would be . . .	1	2	3	4	5
b. expanding areas for bear hunting would be . . .	1	2	3	4	5
c. increasing prevention education would be . . .	1	2	3	4	5

12. What is your attitude toward the following management actions as means to reduce complaints about problems with bears? *(Circle one response for each statement.)*

What is your attitude toward	Very favorable	Favorable	Neither	Unfavorable	Very unfavorable
a. opening southern zone bear hunting seasons earlier	1	2	3	4	5
b. expanding areas for bear hunting	1	2	3	4	5
c. increasing prevention education	1	2	3	4	5

13. How would you describe your personal level of commitment to using the following management actions as means to reduce complaints about problems with bears? *(Circle one response for each statement.)*

	Not at all committed	Slightly committed	Moderately committed	Strongly committed	Unsure
a. Opening southern zone bear hunting seasons earlier	1	2	3	4	5
b. Expanding areas for bear hunting	1	2	3	4	5
c. Increasing prevention education	1	2	3	4	5

14. If the Bear Team were asked to make specific recommendations right now, would you support or oppose the following recommendations as means to reduce complaints about problems with bears? *(Circle one response for each statement.)*

	Strongly support	Support	Neither	Oppose	Strongly oppose
a. A recommendation to open the bear hunting season earlier in the Catskills	1	2	3	4	5
b. Expanding areas for bear hunting in the Catskills	1	2	3	4	5
c. Increasing prevention education in the Catskills	1	2	3	4	5

15. What do you think <u>most BOW staff</u> think should be done to reduce complaints about problems with bears in the Catskills? *(Circle one response for each statement.)*

Most staff in BOW think:	Strongly agree	Agree	Neither	Disagree	Strongly disagree
a. we should open bear hunting season earlier in the Catskills to reduce complaints.	1	2	3	4	5
b. we should expand areas for bear hunting in the Catskills to reduce complaints.	1	2	3	4	5
c. we should increase prevention education in the Catskills to reduce complaints.	1	2	3	4	5

16. How difficult do you think it will be for BOW to implement the following management actions? *(Circle one response for each statement.)*

	Very easy	Easy	Neither	Difficult	Very difficult
a. Opening the Catskill bear hunting season earlier.	1	2	3	4	5
b. Expanding areas for bear hunting.	1	2	3	4	5
c. Increasing prevention education.	1	2	3	4	5

17. How many <u>impediments</u> do you think exist that could prevent BOW from implementing the following management actions? *(Circle one response for each statement.)*

The set of impediments that could keep BOW from taking this action is	Very small	Small	Moderate	Large	Very large
a. Opening the Catskill bear hunting season earlier.	1	2	3	4	5
b. Expanding areas for bear hunting.	1	2	3	4	5
c. Increasing prevention education.	1	2	3	4	5

18. What is your overall sense of how much control BOW can exert over the following problems? *(Circle one response for each statement.)*

In your opinion, how much control can BOW exert over:	No control	Very little control	Slight control	Moderate control	Great control
a. The rate of negative human-bear interactions.	1	2	3	4	5
b. The number of annual complaints about bear-related problems	1	2	3	4	5
c. Concern about bear-related problems	1	2	3	4	5

19. The Bear Team decided to limit this project to discussion of three possible management actions BOW could take to address negative human bear interactions. Are there <u>other</u> actions you would like BOW to take as a means to reduce negative human-bear interactions? (*Check Yes or No)*

_____ No

_____ Yes → → If yes, please describe up to three additional actions

a) Management action # 1:

_____

b) Management action # 2

_____

c) Management action # 3

_____

20. If you suggested actions in question 19, please indicate how you think each would affect the level of negative human-bear interactions. *(Circle one response for each statement.)*

If BOW took these actions, I think the rate of negative human-bear interactions would . . .	Hold steady	Decrease slightly	Decrease greatly
a. My suggestion for action # 1	1	2	3
b. My suggestion for action # 2	1	2	3
c. My suggestion for action # 3	1	2	3

THANK YOU FOR YOUR TIME AND EFFORT!
Please return this form to Bill Siemer, Human Dimensions Research Unit 119 Fernow Hall, Cornell University, Department of Natural Resources, Ithaca, NY 14852-9953 (wfs1@cornell.edu)

APPENDIX H

Post-evaluation questionnaire for Bear Plan Team 2005 Group Model Building Project on Black Bear Management

Assessment of your views after the model building workshops

At the start of this project, you provided information on a few of your beliefs and attitudes about residential problems with bears and potential actions to manage those problems. Responding to this follow-up questionnaire will help us understand whether any of those beliefs or attitudes changed as a result of participating in this project.

The information you provide here will remain confidential. Your name will not be associated with your responses in summary reports about this project.

Please answer the questions at your earliest convenience and return your response to Bill Siemer by regular mail or email. Thank you!

Our Problem Statement and Management Questions

The Bear Team decided to focus this project on understanding why negative human-bear interactions have been increasing in residential areas of New York. The project focused on how changes in hunting opportunity and investment in problem prevention education could be used to reduce negative human-bear interactions in residential areas. Staff available to respond to bear-related complaints emerged as a topic of discussion later in the project.

The questions in the following sections assess your personal opinions about the importance of the problem we explored, and your expectations about changes in hunting opportunity, problem prevention education, and staffing levels as management responses to the problem.

The problem: Negative human-bear interactions are increasing in residential areas of New York State.

Original management questions: Can BOW manage this problem by changing bear hunting regulations or increasing prevention education?

Section 1: Background Information

1. **How long have you:**

been employed by DEC?	**had responsibilities related to the bear program?**
Less than 5 years	Less than 5 years
6 – 10 years	6 – 10 years
11-15 years	11-15 years
More than 15 years	More than 15 years

2. **How would you summarize your job responsibilities with regard to DEC's bear management program?**

My primary job responsibilities related to the bear program are:

Section 2: Urgency of the Problem

3. The following questions address your opinions on the urgency of the problem we focused on in this project (i.e., an increase in negative human bear interactions in residential areas). **For each item, circle the response that best represents your opinion** (1=Strongly Agree, 2=Agree, 3 = Neither, 4=Disagree, 5=Strongly Disagree).

The problem: An increase in negative human-bear interactions in residential areas.	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
a. In my work I often deal with the consequences of this problem.	1	2	3	4	5
b. Managing this problem is important to me personally.	1	2	3	4	5
c. This is a problem that can have serious consequences for BOW if left unresolved.	1	2	3	4	5
d. It is important for BOW to focus attention on this problem.	1	2	3	4	5

4. As someone with responsibility for bear management in New York, what is your evaluation of the events and interactions described below? *(Circle one response for each statement.)*

An increase in:	Very good	Good	Neither Bad nor Good	Bad	Very bad
a. the rate of negative human-bear interactions in residential areas would be	1	2	3	4	5
b. public concern about bear problems in residential areas would be	1	2	3	4	5
c. intolerance to bear problems in residential areas would be	1	2	3	4	5
d. complaints about bear problems in residential areas would be	1	2	3	4	5

5. How <u>likely</u> is it that the following outcomes will occur in New York over the next five years? *(Circle one response for each statement.)*

Over the next 5 years:

	Very Likely	Likely	Neither	Unlikely	Very unlikely
a. The rate of negative human-bear <u>interactions</u> in residential areas will increase.	1	2	3	4	5
b. Public <u>concern</u> about bear problems in residential areas will increase.	1	2	3	4	5
c. <u>Intolerance</u> to bear problems in residential areas will increase.	1	2	3	4	5
d. <u>Complaints</u> about bear problems in residential areas will increase.	1	2	3	4	5

6. How <u>important</u> is it for BOW to achieve the following outcomes? *(Circle one response for each statement.)*

	Not at all important	Slightly Important	Moderately important	Very important	Extremely important
a. <u>Reducing the frequency</u> of negative human-bear interactions is	1	2	3	4	5
b. <u>Reducing concern</u> about bear problems is	1	2	3	4	5
c. <u>Increasing tolerance</u> for bear problems is	1	2	3	4	5
d. <u>Reducing complaints</u> about bear problems is	1	2	3	4	5

Section 3: Your Opinions on the Management Actions Being Discussed

The next few questions focus on your expectations about management actions that the Bear Team discussed during this project.

7. How do you expect interactions, concern, tolerance, and complaints to change now that BOW has opened black bear hunting seasons earlier in the Catskill hunting zone? *(Circle one response for each statement.)*

Because the Catskill bear hunting season is open earlier:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

8. How would you expect interactions, concern, tolerance, and complaints to change in locations where BOW expands the areas open to black bear hunting? *(Circle one response for each statement.)*

In locations where more areas are opened to bear hunting:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

9. How would you expect interactions, concern, tolerance, and complaints to change if BOW invests more resources in problem prevention education? *(Circle one response for each statement.)*

If BOW puts more effort into problem prevention education:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

10. How would you expect interactions, concern, tolerance, and complaints to change if BOW increases staff time for response to bear-related complaints? *(Circle one response for each statement.)*

If BOW increases staff time for response to complaints:	Increase greatly	Increase slightly	Not change	Decrease slightly	Decrease greatly
a. negative human-bear interactions will	1	2	3	4	5
b. concern about bear problems will	1	2	3	4	5
c. tolerance for bear problems will	1	2	3	4	5
d. complaints about bear problems will	1	2	3	4	5

11. Considering all the outcomes that might be produced, do you regard the following management actions as beneficial or harmful? *(Circle one response for each statement.)*

	Very harmful	Harmful	Neither	Beneficial	Very beneficial
a. Opening southern zone bear hunting seasons earlier would be . . .	1	2	3	4	5
b. Expanding areas for bear hunting would be	1	2	3	4	5
c. Increasing prevention education would be	1	2	3	4	5
d. Increasing staff to handle complaints would be	1	2	3	4	5

12. What is your attitude toward the following management actions as means to reduce complaints about problems with bears? *(Circle one response for each statement.)*

	Very favorable	Favorable	Neither	Unfavorable	Very unfavourable
a. Opening southern zone bear hunting seasons earlier	1	2	3	4	5
b. Expanding areas for bear hunting	1	2	3	4	5
c. Increasing prevention education	1	2	3	4	5
d. Increasing staff to handle complaints	1	2	3	4	5

13. If the Bear Team were asked to make specific recommendations right now, would you support or oppose the following recommendations as means to reduce complaints about problems with bears? *(Circle one response for each statement.)*

A recommendation to:	Strongly support	Support	Neither	Oppose	Strongly oppose
a. open the bear hunting season earlier in the Catskills	1	2	3	4	5
b. expand areas for bear hunting in the Catskills	1	2	3	4	5
c. increase prevention education in the Catskills	1	2	3	4	5
d. increase staff to handle complaints in the Catskills	1	2	3	4	5

14. What do you think <u>most BOW staff</u> think should be done to reduce complaints about problems with bears in the Catskills? *(Circle one response for each statement.)*

Most staff in BOW think we should:	Strongly agree	Agree	Neither	Disagree	Strongly disagree
a. open bear hunting seasons early in the fall.	1	2	3	4	5
b. expand areas for bear hunting.	1	2	3	4	5
c. increase prevention education.	1	2	3	4	5
d. increase staff available to respond to complaints.	1	2	3	4	5

15. How difficult do you think it will be for BOW to implement the following management actions? *(Circle one response for each statement.)*

	Very easy	Easy	Neither	Difficult	Very difficult
a. open bear hunting seasons early in the fall.	1	2	3	4	5
b. expand areas for bear hunting.	1	2	3	4	5
c. increase prevention education.	1	2	3	4	5
d. increase staff available to respond to complaints.	1	2	3	4	5

16. In your view, how difficult is it for BOW to change hunting opportunity, investment in problem prevention education, or staffing levels? *(Circle one response for each statement.)*

The set of impediments that could keep BOW from taking action a-d is:	Very small	Small	Moderate	Large	Very large
a. opening bear hunting seasons early in the fall.	1	2	3	4	5
b. expanding areas for bear hunting.	1	2	3	4	5
c. increasing investment in problem prevention education.	1	2	3	4	5
d. increasing staff time for response to bear-related complaints.	1	2	3	4	5

17. What is your overall sense of how much control BOW can exert over the following problems? *(Circle one response for each statement.)*

Level of control BOW can exert over:	No control	Very little control	Slight control	Moderate control	Great control
a. how often negative human-bear interactions occur.	1	2	3	4	5
b. the number of annual complaints about bear-related problems.	1	2	3	4	5
c. concern about bear-related problems.	1	2	3	4	5

18. The Bear Team decided to limit this project to discussion of a few possible management actions BOW could take to address negative human bear interactions. Are there <u>other</u> actions you would like BOW to take as a means to reduce negative human-bear interactions? (*Check Yes or No)*

	No	
	Yes → →	If yes, please describe up to three additional actions

a) Management action # 1:

_____

b) Management action # 2

_____

c) Management action # 3

_____

19. If you suggested actions in question 18, please indicate how you think each would affect the level of negative human-bear interactions. *(Circle one response for each statement.)*

	Hold steady	Decrease slightly	Decrease greatly
a. If my <u>first</u> suggested action were taken, negative human-bear interactions would	1	2	3
b. If my <u>second</u> suggested action were taken, negative human-bear interactions would	1	2	3
c. If my <u>third</u> suggested action were taken, negative human-bear interactions would	1	2	3

Section 4: Quality of the Group Model Building (GMB) process

20. Please indicate your agreement or disagreement with the following statements about the group model-building process. *(Circle one response for each statement.)*

		Strongly agree	agree	Neither	disagree	Strongly disagree
a.	Communication between Bear Team members was clear and understandable.	1	2	3	4	5
b.	Communication between team members and process facilitators was clear and understandable.	1	2	3	4	5
c.	Everyone in the group had a chance to voice their opinions.	1	2	3	4	5
d.	There was ample opportunity to discuss points where people had divergent opinions.	1	2	3	4	5
e.	There was adequate opportunity for open and extensive discussion.	1	2	3	4	5
f.	The process included staff with diverse opinions on bear management.	1	2	3	4	5
g.	It was clear to me how BOW intends to use information from this process.	1	2	3	4	5

Section 5: Results of the Group Model Building (GMB) Process

21. Please indicate your agreement or disagreement with the following statements about outcomes of the group model-building process. *(Circle one response for each statement.)*

The group model building process . . .	Strongly agree	agree	Neither	disagree	Strongly disagree
a. Increased my understanding of the system of factors that produce complaints about residential bear-related problems.	1	2	3	4	5
b. Helped the Bear Team move closer to a shared vision of the bear management system.	1	2	3	4	5
c. Improved my understanding of the opinions of other Bear Team members.	1	2	3	4	5
d. Gave me insight into the possibilities for managing impacts.	1	2	3	4	5
e. Was an efficient way to get staff input for BOW decisions about black bear management.	1	2	3	4	5
f. Improved communication between Bear Team members.	1	2	3	4	5

22. Please indicate your agreement or disagreement with the following statements. *(Circle one response for each statement.)*

	Strongly agree	agree	Neither	disagree	Strongly disagree
a. I learned more about the ways that black bears impact people.	1	2	3	4	5
b. The Bear Team gained insight about managing negative human-bear interactions in residential areas.	1	2	3	4	5
c. This process required team members to consider a broader range of viewpoints than they would have otherwise.	1	2	3	4	5
d. This process got the team focused on a management problem that I would not have given much consideration otherwise.	1	2	3	4	5
e. This process got the team thinking about management action alternatives that I would not given much consideration otherwise.	1	2	3	4	5
f. There was adequate opportunity for open and extensive discussion.	1	2	3	4	5
g. All the impacts that need attention in residential areas were discussed.	1	2	3	4	5
h. A broad range of useful solutions were discussed.	1	2	3	4	5
i. In the process the pros and cons of possible solutions were attended to.	1	2	3	4	5
j. The actions that team members suggested to manage complaints were based on sound arguments.	1	2	3	4	5

Section 6: Quality of the Group Model Building (GMB) Process

23. The purpose of the GMB process was to help DEC staff refine their understanding of key impacts in your region and consider relationships between management strategies and desired outcomes. Please indicate whether you think the process achieved these purposes. *(Circle one response for each statement.)*

How would you rate the group model building process on the following:	Very poor	poor	good	Very good	Not sure
a. As a way to clarify how bears impact people in residential areas.	1	2	3	4	5
b. As a way to identify which impacts matter most to people in residential areas.	1	2	3	4	5
c. As a way to stimulate thinking about what might be the best management strategies (means) to achieve desired outcomes (ends) in residential areas.	1	2	3	4	5

THANK YOU FOR YOUR TIME AND EFFORT!

Please return this form to: Bill Siemer, 119 Fernow Hall, Department of Natural Resources, Cornell University, Ithaca, NY 14852-9953 (wfs1@cornell.edu)

APPENDIX I

Semi-Structured Personal Interviews with Agency Staff

Interview purpose

AIM represents an innovation in the management cycle because it: 1) focuses on impacts; 2) utilizes an informed transactional approach to stakeholder engagement; and 3) emphasizes systems thinking/modeling. I conducted semi-structured personal interviews with wildlife agency staff to gather insights about this tri-part innovation from the perspective of wildlife professionals who implemented an AIM approach to black bear management.

The interview data serve two purposes. First, they provide convergent information about outcomes associated with AIM implementation (i.e., the interviews provide data with which to triangulate findings from other data collection techniques). Second and perhaps more importantly), the interview data provide insights about why things were implemented as they were and why DEC staff think their organization will or will not continue using various aspects of the innovation.

I focused more than half of the interview time on activities associated with situational analysis (Riley et al. 2003), which in this case unfolded in multiple steps to identify impacts, clarify impacts, and utilize survey data and a mass media content analysis to improve understanding of how stakeholders form impact perceptions. I utilized the remaining interview time to explore activities within several other steps in the management process (e.g., objective setting, systems thinking/models, and identification and selection of management alternatives).

Objectives:

1. Identify managers' perceptions of outcomes associated with AIM implementation between 2001 and 2008.

2. Learn about the challenges and opportunities managers perceive as they attempted to: a) increase focus on impacts; b) place greater emphasis on systems thinking/systems modeling; and c) take an informed transactional approach to stakeholder engagement.

3. Characterize managers' perceptions about AIM as a process innovation (i.e., perceptions of relative advantage, compatability, complexity, trialability, observability, and uncertainty).

4. Characterize how managers' believe that traits of DEC as an organization enhance or impede their ability to implement AIM.

5. Characterize how training, organizational support, and attitudes toward the innovation personal traits (i.e., traits of the innovation users) enhance or impede implementation of AIM.

Concepts to be explored through interviews:

Characteristics of the innovation

Studies have demonstrated that the following characteristics influence the rate and extent of innovation adoption. The same traits influence continued use of an innovation after the adoption decision point.

- Relative advantage: Innovations have relative advantage if the perceived benefits of the innovation exceed benefits of alternatives. In this case, the clear alternative is continuation of the existing approach to working through a management cycle.

- Compatability: Is the innovation compatible with the beliefs, values, and practices of the intended user?

- Complexity: Complex innovations are generally adopted slower than simple innovations. Complexity makes implementation more difficult and can lead to discontinuation after the adoption decision.

- Trialability: Can the user try out the innovation easily, or does it take substantial resources to conduct a trial?

- Observability: Can users easily see the results of using the process innovation? Do benefits acrue quickly or does it take years to see the payoff?

- Uncertainty: (uncertainty about outcomes) Innovation adoption studies show that people are reluctant to adopt innovations due to uncertainty about whether adoption will have relative advantage for them. As more of a group adopts the innovation, remaining members of the group seem to become more certain that they too can benefit from adopting the innovation. A tipping point is reached, where adoption by 10-25% of a reference group reduces uncertainty and adoption rate then increases rapidly. In my case, the question is, did the Bear Team's experience in this case reduce their uncertainty about the whether innovation had relative advantage? This would be especially important to know from decision makers like John Major. (*My impression is that the GMB experience did not reduce their uncertainty about the relative advantages of future quantitative modeling. My guess is that other agencies will wait to see quantitative modeling success stories before they do it themselves – a catch 22 situation). Risk aversion leads to adoption groups: the innovators, early adopters, early majority, late majority, and laggards.

Characteristics of the organization

- Organization structure
    - Regional vs. central office decision making
    - Centralized structure for communication with publics (e.g., control of messages through Office of Public Affairs)
    - Composition of workforce (does the composition of BOW workforce provide skill sets that facilitate or impede implementation of AIM)
    - Resource limitations (e.g., staff size, funding)

- Organizational culture
    - Innovativeness
    - Technocratic bias

Characteristics of the innovation users

- Training: Implementation of a process innovation usually requires certain capacities or skill sets within the staff expected to carry out implementation. Staff training is an important component of developing staff capacity. Training experiences and training needs can vary by individual, depending in part on the role and responsibilities of a given individual. One important facet of this concept is staff perception of whether they have received adequate training necessary for a person in their role to successfully implement AIM?

- Agency support. Agency support includes provision of resources necessary to implement an innovation. Support needs can vary for different individuals and functional units within a wildlife agency.

- Personal beliefs and attitudes. One's personal viewpoint on whether they or their agency should be using the innovation have bearing on the degree to which an individual will contribute to innovation implementation, especially continuation after some trial period of innovation use.

Desired outcomes of AIM implementation

- Increased deliberation about …
    - Impacts
    - Fundamental objectives
    - Potential management actions to manage impacts
- Opportunities for learning…
    - by agency staff
    - by stakeholders
    - ("improvements in shared learning among scientists, managers, and stakeholders.)

- Value-focused thinking (thinking about desired ends in terms of impacts, and selecting means based on their expected ability to achieve a specific end).
- Movement toward an informed transactional approach to stakeholder engagement

Interview structure: 60-90 minute interview, with three 20-30 minute segments.

- Introduction: I'll begin by taking a couple of minutes to review the purpose and structure of the interview (i.e., review the points written on the cover memo sent to interviewee in advance)
- Segment 1: Reflections on impacts identification and clarification (and the informed transactional approach to stakeholder engagement used to identify and clarify impacts).

- Segment 2: Reflections on work to understand media messages and influence of media use on stakeholders' perceptions of impacts.

- Segment 3: Reflections on systems thinking/modeling as part of AIM.

Structure for the 20-30 minute reflection segments

1. **I will take 3-5 minutes to review HDRU-DEC activities on the topic** (i.e., review content on Figure 1 and the activity summary for that topic, both sent to the interviewee in advance).

    - In segment one I'll remind the interviewee that we: began with a team effort to review existing information on impacts; conducted nominal groups in three regions to inform questionnaire design; conducted the statewide mail survey to assess impacts; conducted a SIG process in five areas; met as a team to deliberate about impacts; and linked impacts to fundamental objectives and means to achieve desired impact levels.

    - In segment two, I'll remind interviewees that I did media effects research, Meredith and I did media effects work and risk perception work (that is the informed part). I'll remind them of the parts of their work that address the "transactional" part of the equation (noting that most of that work isn't different from what they did before we started talking about AIM).

    - In segment three, I'll remind interviewees that we conducted the group modeling project (all the GMB activities make up the "informed part of the equation), and I have tried to communicate that work back to other professionals (the transactional part)

2. **I'll ask probing questions to assess perceived outcomes of the pilot implementation.** (Somehow I need to explicitly tell the interviewee that I am looking for responses from them that clarify whether AIM in practice lived up to expectations. If it did not meet expectations, what are their thought on why

it didn't deliver as expected? What impediments help the group back? What factors helped the team succeed in areas where it did provide benefits?

- From your perspective, did this body of work on impacts produce positive outcomes for DEC or stakeholders? What were those outcomes?
  - Was the level of deliberation about impacts greater than in the past?
  - Did it produce learning for the Bear Team or stakeholders?
  - Did it help the team focus more on ends and less on means (did it encourage value-focused thinking)?

- One of the premises of AIM is that agencies should focus on impacts rather than on the status of a habitat or a wildlife population, per se. Now that you have been part of an effort to implement AIM for black bears, do you believe it was <u>useful</u> for DEC to focus on impacts rather than on a certain bear population level? Why, [or] why not?

- Overall, do you think this body of work on … was worthwhile? Why/Why not?
  - Segment one: the body of work on impacts
  - Segment two: the body of work to gather stakeholder input and provide feedback to inform stakeholders
  - Segment three: the body of work pm systems thinking and modeling

- Looking back, do you think that the bear management program in 2008 is better, worse, or about the same as it was before the AIM work started in 2001? How is it different and why?

3. **As outcomes are described (positive outcomes, negative outcomes, or lack of outcomes), I'll ask follow up questions about <u>traits of AIM</u> that may explain why outcomes did or did not occur.**

   - Did the impact identification steps benefit DEC or stakeholders in ways that the typical approach to bear management would not?

   - Was this investment of DEC resources in impact assessment consistent with DEC staff beliefs, values and practices? Why/Why not?

   - Was it too complex to assess impacts?

   - Now that you have been through the trial use of AIM, what are your thoughts on whether other staff could try AIM out in their regions or for other management programs?

- Was it hard to see any payoff for DEC that results from all this work to measure impacts?

- Did participating in this pilot project reduce your uncertainty about whether impact identification will be useful in DEC programs? Why/why not?

4. **As outcomes are described, I'll ask follow-up questions about traits of BOW/DEC that may explain why outcomes did or did not occur.**

   - Are there traits of BOW or DEC that you think influenced the Bear Teams' ability to implement an approach that focused on:
     - identifying and clarifying impacts?
     - incorporating media research in situation analysis?
     - systems modeling as an aid to think through potential management actions?

   - Are there traits of BOW or DEC that you think will influence whether BOW will keep using an AIM approach for bears or other species?

     - Probe about innovativeness
     - Probe about technocratic bias
     - Probe about resource limitations
     - Probe about staff skill sets and putting together management teams with diverse expertise and perspectives

5. **As outcomes are described, I'll ask follow-up questions about a few personal characteristics that might explain their perceptions of outcomes:**

   - Did you have adequate training to assist with the impact identification and clarification work? What kind of training does a person in your role in the agency need to successfully implement AIM?

   - Did you have the agency support you needed to complete this work? What kinds of support does a person in your role need to successfully implement AIM?

   - Do you personally believe that focusing on impacts is a step in the right direction for bear management?

6. **I'll ask whether their experiences in the pilot implementation lead them to believe that DEC will or should continue implementing AIM, and then I'll ask why they hold those beliefs.**

- Now that you have been through an AIM pilot, would you recommend that other staff use an AIM approach?
  - Segment one: Would you recommend that BOW staff try to base their fundamental objectives on impact assessment? Why/Why not?
  - Segment two: Would you recommend that BOW staff try to include research on media messages as they do a situation analysis for a management plan? Why/Why not?
  - Segment three: Would you recommend that BOW staff try to use quantitative modeling to inform their management plans? Would you recommend that BOW staff try to incorporate qualitative modeling (like the causal loop model we developed) into their planning? Why/Why not?

- Do you think the Bear Team will do more of this work or less of this impacts work in the future? Why?

- What do you see as the critical factors that will determine whether DEC continues using an impact-focus for bear management in the future?

Materials to send to interviewee in advance:

- "Protocol" document: Brief written piece that states the purpose of the interview, estimated time to complete, a few details about the three segments of the interview (i.e., segments on impacts, informed transactional approach, systems thinking and modeling), and instructions to review provided hard copy materials in advance of the interviews. The protocol will point out that the three segments of the interview actually involve overlapping work and closely interrelated concepts.

- Informed transactional approach (ITA): ITA will be represented by the "clover leaf" Powerpoint figure. I will point out that it involves impacts work, media-related work, and modeling-related work. This figure is the starting point for the conversation and should serve as a touchstone throughout the interview. *ITA is not really a separate piece; it is an integral part of the other three pieces (impacts, media, systems thinking). The "informed" part of ITA means informed by impacts identification and clarification, informed by an understanding of how media influence impact perceptions, and informed by systems thinking. The "transactional" part of ITA means transactional engagement of stakeholders. Feedback loops to media and to wildlife professionals indirectly become feedback to stakeholders.

- Impacts work summary table: This table will simply identify aspects of the impacts work chronologically. It includes internal work by the Bear Team, external work with stakeholders, and media effects work conducted by Siemer et al. and Gore et al. (In interviews I can remind them of this body of work, tell them that the AIM paper suggests that such work can be like "improvisational theater", then I can ask them if they thought it was worthwhile, why, and what will keep them from doing more of this in the future.
    - Here is the quote from AIM: "Flexibility in forums and processes that accounts for context specificity (e.g., scale of concern) is vital for sustained citizen participation (Chase, Siemer, & Decker, 1999). An appropriate image of the process is improvisational theatre, where the director (wildlife manager) guides the flow of interactions and analyses, but is capable of adapting to include new actors and techniques as the actual plot unfolds (Payne , Bettman, & Johnson, 1993)."

- Media work summary table: (repeat format of impacts table for media work)

- Systems modeling work summary table: (repeat format of impacts table for media work)

- (*Note: This is an incomplete list of research questions that come from tables in chapter 3. Those tables will need to be updated now that I have thought through my approach for personal interviews with DEC staff)

Impacts-related research questions (how, what, why questions)

- R1: Did this attempt to implement AIM stimulate deliberation about impacts?
- R2: Did deliberation about impacts contribute to learning?
- R3: How did this attempt to implement AIM influence managers' decision frames?
- R4: Did this attempt to implement AIM encourage managers to employ value-focused thinking (i.e., did it get managers more focused on ends instead of means?)
- R5: Why did this case live up to (or fail to fulfill) the propositions (assumptions) of the AIM authors?

Media-related research questions (how, what, why questions)

- R6: Did research on media frames and influence of media use on stakeholder perceptions of impacts provide wildlife managers' any relative advantage with regard to AIM situation analysis? Why or why not?

System-model-related research questions

- R7: What are the challenges and opportunities of using quantitative group-model-building techniques for issue education with teams of wildlife managers?
- R8: Why did this case live up to (or fail to fulfill) the propositions (assumptions) of the AIM authors?

Overall, the interview data should help me understand AIM in practice as opposed to AIM in theory. It should provide information from practitioners about the assumptions and premises of AIM in the context of actual practice.

Example for impacts segment of the interview: This segment begins with a quick review of the impacts-related components of this project between 2001 and 2008. I need to define the concept area in a consistent way so that each interviewee has the same starting point. I will have a written table summary that every interviewee receives in advance of the interview. For impacts, the description will show that it was a multi-step process that drew on different sources of information to verify existing impacts concepts and to be open to the possibility of identifying new categories of impacts. It will also be important to point out that we linked the impacts to fundamental objectives and management actions. I also need to mention media effects research as part of the work done to clarify how impact perceptions are formed.

Overall questions:

- One of the premises of AIM is that agencies should focus on impacts rather than on the status of a habitat or a wildlife population, per se.
- Now that you have been part of an effort to implement AIM for black bears, do you believe it was useful for DEC to focus on impacts rather than on a certain bear population level? Why, [or] why not?
- Do you think that focusing on impacts is a step in the right direction for DEC as an agency, or do you think it is misguided? (Please explain).
- Do you think the Bear Team will do more of this work or less of this impacts work in the future? Why?

Questions about implementing the impacts work:

- What do you see as the critical factors that will determine whether DEC continues using an impact-focus for bear management in the future?
- Looking back, do you think that the bear management program in 2008 is better, worse, or about the same as it was before the AIM work started in 2001? How is it different and why?

WORKS CITED

Andersen, D. F., Richardson, G. P., and J. A. Vennix. 1997. Group model building: Adding more science to the craft. System Dynamics Review 13(2):187-201.

Allen, G.M. and E. M. Gould. 1986. Complexity, wickedness, and public forests. Journal of Forestry 84(4):20-23.

Beall, A., L. Zeoli, A. Ford, R. Jackson, S. Langsdale, P. Otto., W. Siemer, K. Stave, J. Struben, V. Tidwell, N. Videira, and M. van den Belt. 2006. Participatory Modeling for Adaptive Management: Reports from the Field. Poster, 24th International Conference of the System Dynamics Society. July 23-27, 2006. Nijmegen, Netherlands.

Beierle, T. C. 2002. The quality of stakeholder-based decisions. Risk Analysis 22(4): 739-749.

Bosch, O. J. H., A. H. Ross, and J. S. Beeton. 2003. Integrating science and management through collaborative learning and better information management. Systems Research and Behavioral Science 20:107-118.

Boyer, E. L. 1996. The scholarship of engagement. Journal of Public Service and Outreach 1(1):11-20.

Boyer, E. L. 1990. (A Special Report) Scholarship reconsidered: Priorities for the professoriate. The Carnegie Foundation for the Advancement of Teaching, Princeton, New Jersey.

Carpenter, S. R., and L. H. Gunderson. 2001. Coping with collapse: Ecological and social dynamics in ecosystem management. Bioscience 51(6):451-457.

Chase, L. C., T. M. Schusler, and D. J. Decker. 2000. Innovations in stakeholder involvement: What's the next step? Wildlife Society Bulletin 28:208-217.

Chase, L. C., T. B. Lauber, and D. J. Decker. 2001. Citizen participation in wildlife management. Pages 153-170 *in* Decker, D. J., T. L. Brown, and W. F. Siemer, editors. Human Dimensions of Wildlife Management in North America. The Wildlife Society, Bethesda, Maryland.

Clark, T. W. 1992. Practicing natural resource management with a policy orientation. Environmental Management 16(4):423-433.

Coggins, G. C., C. F. Wilkinson, J. D. Leshy, and R. L. Fischman. 2007. Federal public land and resources law (sixth edition). Foundation Press, New York, New York.

Corbett, J. 1992. Rural and urban newspaper coverage of wildlife: Conflict, community and bureaucracy. Journalism Quarterly 69(4):929-937.

Crosson, P. H. 1983. Public service in higher education: Practices and priorities. ASHE-ERIC Higher Education Research Report. No. 7, 1983. ERIC Clearinghouse on Higher Education. The George Washington University, Washington D.C.

Crowe, D. M. 1983. Comprehensive planning for wildlife resources. Wyoming Game and Fish Department, Cheyenne, Wyoming.

Curtis, P. D., W. F. Siemer, and J. E. Shanahan. 2003. The role of educational intervention in community-based deer management. Transactions North American Wildlife and Natural Resources Conference 68:197-208.

Dale, D. D., and A. J. Hahn. 1994. Public issues evolution: Increasing competence in resolving public issues. University of Wisconsin Extension, Madison, Wisconsin.

Damanpour, F. 1992. Organizational size and innovation. Organizational studies13(3):375-402.

Daniels, S. E., and G. B. Walker. 2001. Working through environmental conflict: The collaborative learning approach. Praeger, Westport, Connecticut.

Darke, P., G. Shanks, and M. Broadvent. 1998. Information Systems 8:273-289.

Davidson, D. J., and W. R. Freudenburg. 1996. Gender and environmental risk concerns: A review and analysis of available research. Environment and behavior 28(5):302-339.

Decker, D. J. 1985. Agency image: A key to successful natural resource management. Transactions Northeast Section The Wildlife Society 41:43-56.

Decker, D. J., T. L. Brown, N. A. Connelly, J. W. Enck, G. A. Pomerantz, K. G. Purdy, and W. F. Siemer. 1992. Toward a comprehensive paradigm of wildlife management: Integrating the human and biological dimensions. Pages 33-54 *in* W. R. Mangun, editor. American Fish and Wildlife Policy: the Human Dimension. Southern Illinois University Press, Carbondale, Illinois.

Decker, D. J., T. L. Brown, D. L. Hustin, S. H. Clarke and J. O'Pezio. 1981. Public Attitudes Toward Black Bears in the Catskills. New York Fish and Game Journal 28(1):1-20.

Decker, D. J., T. L. Brown, and W. F. Siemer (editors). 2001. Human Dimensions of Wildlife Management in North America. The Wildlife Society, Bethesda, Maryland.

Decker, D. J., T. L. Brown, and W. F. Siemer. 2001. Wildlife management as a process. Pages 77-90 (Chapter 5) *in* Decker, D. J., T. L. Brown, and W. F. Siemer, editors. Human Dimensions of Wildlife Management in North America. The Wildlife Society, Bethesda, Maryland.

Decker, D. J., and L. C. Chase. 1997. Human dimensions of living with wildlife—A

management challenge for the 21st century. Wildlife Society Bulletin 25:788-795.

Decker, D. J. and G. Goff (editors). 1987. Valuing Wildlife: Economic and social perspectives. Westview Press, Boulder, Colorado.

Decker, D. J., C. C. Krueger, R. A. Baer, Jr., B. A. Knuth, and M. E. Richmond. 1996. From clients to stakeholders: a philosophical shift for fish and wildlife management. Human Dimensions of Wildlife 1:70-82.

Decker, D. J., T. B. Lauber, and W. F. Siemer. 2002. Human - Wildlife Conflict Management: A Practitioner's Guide. Northeast Wildlife Damage Management Research and Outreach Cooperative, Ithaca, New York.

Decker, D. J. and J. O'Pezio. 1989. Consideration of bear-people conflicts in black bear management for the Catskill region of New York: Application of a comprehensive management model. Pages 181-187 in M. Bromley, editor. Bear-people conflicts: Proceedings of a symposium on management strategies. Northwest Territories Department of Renewable Resources, Yellowknife, Northwest Territories.

Decker, D. J., and K. G. Purdy. 1988. Toward a concept of wildlife acceptance capacity in wildlife management. Wildlife Society Bulletin 16:53-57.

Decker, D. J., D. B. Raik, and W .F. Siemer. 2004. Community-based suburban deer management: A practitioner's guide. Northeast Wildlife Damage Management Research and Outreach Cooperative, Ithaca, New York.

Decker, D. J., R. E. Shanks, L. A. Nielsen, and G. R. Parsons. 1991. Ethical and scientific judgments in management: beware of blurred distinctions. Wildlife Society Bulletin 19(4):523-527.

Decker, D., Siemer, W., Leong, K. and Riley, S. 2008b. A Guide to Developing Manager's Model from Scratch, Fall 2008 edition. Human Dimensions Research Unit. Department of Natural Resources, Cornell University, Ithaca, New York.

Decker, D. J., W. F. Siemer, K. M. Leong, S. J. Riley, B. A. Rudolph, and L. H. Carpenter. 2008a. Conclusion: What is wildlife management? Pages 315-327 *in* M. J. Manfredo, J. J. Vaske, P. J. Brown, D. J. Decker, and E. A. Duke, editors. Wildlife and Society: The Science of Human Dimensions. Island Press, Washington, D.C.

Decker, D. J., R. A. Smolka, J. O'Pezio, and T. L. Brown. 1985. Social considerations of black bear management for the northern Catskill Mountains. Pages 239-247 in S. L. Beasom and S. F. Roberson, editors. Game Harvest Management. Caesar Kleberg Wildlife Institute, Kingsville, Texas.

Denison, D. R. 1996. What is the difference between organizational culture and organizational climate? A native's point of view on a decade of paradigm wars. Academy of Management Review 21(3):619-654.

Dewer, R. D., and J. E. Dutton. 1986. The adoption of radical and incremental innovations: An empirical analysis. Management Science 32(11):1422-1433.

Extension Committee on Organization and Policy (ECOP). 1992. Public issues education: The Cooperative Extension system's role in addressing public issues. Extension Service, USDA, Washington, D. C.

Enck, J. W., D. J. Decker, S. J. Riley, J. F. Organ, L. H. Carpenter, and W. F. Siemer. 2006. Integrating Ecological and Human Dimensions in Adaptive Management of Wildlife-related Impacts. Wildlife Society Bulletin 34(3):698-705.

Entman, R. M. 1993. Framing: Toward clarification of a fractured paradigm. Journal of Communication 43:51-58.

Extension Committee on Organization and Policy (ECOP). 1992. Public issues education: The Cooperative Extension system's role in addressing public issues. USDA Extension Service, Washington, D. C.

Feldman, D. L. 2008. Barriers to adaptive management: Lessons from the Appalachicola-Chattahoochee-Flint Compact. Society and Natural Resources 21:512-525.

Fischer, F. 1980. Politics, values, and public policy: The problem of methodology. Westview Press, Boulder, Colorado.

Fischer, F. 2000. Citizens, Experts, and the environment: The politics of local action. Duke University Press, Durham, North Carolina.

Fischhoff, B., P. Slovic, S. Lichtenstein, S. Read, and B. Combs. 1978. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. Policy Sciences 9:127-152.

Flynn, J., E. Peters, C. K. Mertz, and P. Slovic. 1998. Risk, media, and stigma at Rocky Flats. Risk Analysis 18(6):715-727.

Forester, J. 1999. The deliberative practitioner: Encouraging participatory planning processes. The MIT Press, Cambridge, Massachusetts.

Forrester, J. W. 1968. Principles of Systems (second edition). Productivity, Portland, Oregon.

Frambach, R. T., and Niels Schillewaert. 2002. Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. Journal of Business Research 55:163-176.

Franklin, T. M., and K. B. Reis. 1996. Teaming with wildlife: an investment in the future of wildlife management. Wildlife Society Bulletin 24:781-782.

Franz, N. K. 2002. Transformative learning in intraorganization partnerships: What are the levers to bring about change? Unpublished PhD dissertation. Department of Education, Cornell University, Ithaca, New York.

Franz, N. K. 2007. Adult education theories: Informing Cooperative Extension's transformation. Journal of Extension (Online) 45(1), article 1FEA1. Available:http://www.joe.org/joe/2007february/al.shtml. Accessed July 15, 2007.

Fraser, D. 1985. Piggery perspectives on wildlife management and research. Wildlife Society Bulletin 13:183-187.

Frechtling, J. A. 2007. Logic modeling methods in program evaluation. John Wiley & Sons, Inc, San Francisco, California.

Frewer, L. J. and G. Rowe. 2002. Evaluating public participation exercises: Strategic and practical issues. Pages 85-106 *in* J. Caddy, editor. Evaluating public participation in policy making. Organization for Economic Co-Operation and Development (OECD), Paris, France.

Fulton, D. C., M. J. Manfredo, and J. Lipscomb. 1996. Wildlife value orientations: A conceptual and measurement approach. Human Dimensions of Wildlife 1(2): 24-47.

Funnell, S. 1997. Program logic: An adaptable tool for designing and evaluating programs. Evaluation News and Comments: The Magazine of the Australasian Evaluation Society 69(1):5-17.

Gamson, W. A. 1992. The social psychology of collective action. Pages 53-76 in Morris, A. D. and C. McClurg Mueller, editors. Frontiers in social movement theory. Yale University Press, New Haven, Connecticut.

Gersick, C. J. G. 1991. Revolutionary change theories: A multilevel exploration of the punctuated equilibrium paradigm. Academy of Management Review 16(1):10-36.

Gigliotti, L. M., and D. J. Decker. 1992. Human dimensions in wildlife education: preservice opportunities and in-service needs. Wildlife Society Bulletin 20(1): 8-14.

Gill, B. 1996. The Wildlife Society subculture: The case of the crazy aunt. Human Dimensions of Wildlife 1(1):60-69.

Gopalakrishnan, S., and F. Damanpour. 1997. A review of innovation research in economics, sociology and technology management. Omega, International Journal of Management Science 25(1):15-28.

Gore, M. L. and B. A. Knuth. 2006. Attitude and behavior change associated with the New York NeighBEARhood Watch Program. HDRU Series Report 06-14. Department of Natural Resources, Ithaca, New York.

Gore, M. L., Knuth, B. A., Scherer, C. W., and P.D. Curtis. (In Review). Evaluating a conservation investment designed to reduce human-wildlife conflict.

Gore, M. L., W. F. Siemer, J. E. Shanahan, D. Schuefele, and D. J. Decker. 2005. Effects on risk perception of a bear-related human fatality. Wildlife Society Bulletin 33(2):507-516.

Gregory, R. 2000. Using stakeholder values to make smarter environmental decisions. Environment 42: 34-44.

Gustafson, P. E. 1998. Gender differences in risk perception: Theoretical and methodological perspectives. Risk analysis 18(6):805-811.

Guynn, D. E., and M. K. Landry. 1997. A case study of citizen participation as a successful model for innovative solutions for natural resource problems. Wildlife Society Bulletin 25(2):392-398.

Hahn, A. J. 1988. Resolving public issues and concerns through policy education. Information Bulletin 214. Cornell Cooperative Extension, Cornell University: Ithaca, New York.

Hahn, A. J. 1990. Issues-oriented public policy education: A framework for integrating the process. Journal of Extension 28:15-19.

Hammond, J., R. Keeney and H. Raiffa. 1999. Smart choices. Harvard University Press, Cambridge, Massachusetts.

Hancock, D. R., and B. Algozzine. 2006. Doing case study research: A practical guide for beginning researchers. Teachers College Press, New York, New York.

Hannon, B. and M. Ruth. 2001. Dynamic modeling (second edition). Springer, New York, New York.

Hayes, J. 2007. The theory and practice of change management (second edition). Palgrave Macmillan, New York, New York.

Henry, R., N. Tripp, V. Gilligan, E. Smith, G. Pratt, J. Fodge, and L. Berchielli. 2001. Standard Operating Procedure Manual (SOPM) for Black Bear in New York State. New York State Department of Environmental Conservation: Albany, New York.

Herrero, S. 1985. Bear attacks: their causes and avoidance. Nick Lyons Books/Winchester Press, Piscataway, New Jersey.

Herrero, S. 2005. During 2005 more people killed by bears in North America than in any previous year. International Bear News 14(4):34-35.

Herrero, S., and S. Fleck. 1990. Injury to people inflicted by black, grizzly or polar bears: Recent trends and new insights. International Conference on Bear Research and Management 8:25-32.

Hines, J. 2001. The "standard method." Massachusetts Institute of Technology, Boston, Massachusetts.

Holling, C. S. (editor). 1978. Adaptive environmental assessment and management. John Wiley & Sons, Inc., New York, New York.

Holling, C. S., F. Berkes, and C. Folke. 1998. Science, sustainability, and resource management. Pages 342-362 in Berkes, F., C. Folke, and J. Colding, editors. Linking social and ecological systems: Management practices and social mechanisms for building resilence. Cambridge University, Cambridge, United Kingdom.

Hoyle, R. H (editor). 1995. Structural equation modeling: Concepts, issues, and applications. Sage Publications, Thousand Oaks, California.

Iyengar, S. 1987. Television news and citizens' explanations of national affairs. American Political Science Review 81:815-831.

Iyengar, S. 1991. Is anyone responsible?: How television frames political issues. University of Chicago Press, Chicago, Illinois.

Iyengar, S. 1996. Framing responsibility for political issues. Annals, AAPSS 546(July):59-70.

Jacobson, C. A., and D. J. Decker. 2006. Ensuring the future of state wildlife management: Understanding challenges for institutional change. Wildlife Society Bulletin 34(2):531-536.

Jacobson, C. A., D. J. Decker, and L. Carpenter. 2007. Securing alternative funding for wildlife management: Insights from agency leaders. Journal of Wildlife Management 71(6):2106-2113.

Jaffe, D. 1998. Institutionalized resistance to asynchronous learning networks. Journal for Asynchronous Learning Networks 2(2): 21-32.

Kaplan, B., and D. Duchon. 1988. Combining qualitative and quantitative methods in information systems research: A case study. MIS Quarterly 12(4):571-586.

Kahneman, D. and A. Tversky. 2000. Choices, values, and frames. Cambridge University Press, Russell Sage Foundation, New York, New York.

Kahneman, D., P. Slovic, and A. Tversky. 1982. Judgment under uncertainty: Heuristics and biases. Cambridge University, Cambridge, United Kingdom.

Kaplan 2000. Structural equation modeling: Foundations and Extensions. Sage Publications, Los Angeles, California.

Kasperson, R. E. 1992. The social amplification of risk: Progress in developing an integrative framework of risk. Pages 153-178 *in* S. Krimsky and D. Golding, editors. Social theories of risk. Praeger, New York, New York.

Kasperson, R. E., N. Jhaveri, and J. X. Kasperson. 2001. Stigma and the social amplification of risk: Toward a framework of analysis. Pages 9-27 *in* Flynn, J., P. Slovic, and H. Kunreuther, editors. 2001. Risk, media, and stigma: Understanding public challenges to modern science and technology. Earthscan Publications Ltd, Sterling, Virginia.

Kasperson, R. E., O. Renn, P. Slovic, H. Brown, J. Emel, R. Goble, J. X. Kasperson, and S. Ratick. 1988. The social amplification of risk: A conceptual framework. Risk Analysis 8:177-187.

Keeney, R. L. 1992. Value-focused thinking: A path to creative decision making. Harvard University Press, Cambridge, Massachusetts.

Kemmis, S., and R. McTaggart. 2000. Participatory action research. Pages 567-606 *in* N. K. Denzin and Y. S. Lincoln, editors. Handbook of qualitative research, 2nd ed. Sage Publications, Thousands Oaks, California.

Kennedy, A. M. 1983. The adoption and diffusion of new industrial products: A literature review. European Journal of Marketing 17:31-88.

Kessler, W. B., S. Csanyi, and R. F. Field. 1998. International trends in university education for wildlife conservation and management. Wildlife Society Bulletin 26(4):927-936.

Klein, K. J., and J. Speer Sorra. 1996. The challenge of innovation implementation. The Academy of Management Review 21(4):1055-1080.

Krausman, P. R. 2000. Wildlife management in the twenty-first century: Educated predictions. Wildlife Society Bulletin 28(3):490-495.

Krippendorff, K. 2004. Reliability in content analysis: Some common misconceptions and recommendations. Human Communication Research 30:411-433.

Krueger, C. C., D. J. Decker, and T. A. Gavin. 1986. A concept of natural resource management: An application to unicorns. Transactions Northeast Section The Wildlife Society 43:50-56.

Lafon, N. W. 2002. Evolution of stakeholder knowledge, attitudes, and opinions throughout a participative process to develop a management plan for black bears in Virginia. Masters thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Lafon, N. W., S. L. McMullin, D. E. Steffen, and R. S. Schulman. 2004. Improving stakeholder knowledge and agency image through collaborative planning. Wildlife Society Bulletin 32(1):220-231.

Lancia, R. A., C. E. Braun, M. W. Collopy, R. D. Dueser, J. G. Kie, C. J. Martinka, J. D. Nichols, T. D. Nudds, W. R. Porath, and N. G. Tilghman. 1996. ARM! for

the future: Adaptive resource management in the wildlife profession. Wildlife Society Bulletin 24(3):436-442.

Landre, B. K. and B.A. Knuth. 1993. Success of citizen advisory committees in consensus-based water resources planning in the Great Lakes Basin. Society and Natural Resources 6:229-257.

Landy, M. K. 1995. The new politics of environmental policy. Pages 207-227 in Landy M. K. and M. A. Levin, editors. The new politics of public policy. Johns Hopkins University Press, Baltimore, Maryland.

Lee, K. N. 1999. Appraising adaptive management. Conservation Ecology 3(3). [online] URL: http://www.consecol.org/vol3/iss2/art3.

Leonard-Barton, D. 1990. A dual methodology for case studies: Synergistic use of a longitudinal single site with replicated multiple sites. Organizational Science 1(3):248-266.

Leong, K.M., K.A. McComas, and D.J. Decker. 2007. Matching the Forum to the Fuss: Using Coorientation Contexts to Address the Paradox of Public Participation in Natural Resource Management. Environmental Practice 9(3):195-205.

Leopold, A. 1930. Report to the American Game Conference on an American game policy. Transactions of the American Game Conference 17:281-283.

Leopold, A. 1933. Game Management. Charles Scribner's Sons, New York, New York.

Lombardi, M., J. Snyder-Duch, and C. C. Brachen. 2002. Content analysis in mass communication research: An assessment and reporting of intercoder reliability. Human Communication Research 28:587-604.

Luna-Reyes, L. F., I. J. Martinez-Moyano, T. A. Pardo, A. M. Cresswell, D. F. Andersen, and G. P. Richardson. 2006. Anatomy of a group model-building intervention: Building dynamic theory from case study research. System Dynamics Review 22(4):291-320.

Mangel, M., L. M. Talbot, M. Meffe, G. K. Agardy, M. Tundi, D. L. Alverson, et al. 1996. Principles for the conservation of wild living resources. Ecological Applications 6:338–362.

Mangun, W. R. 1992. Fish and wildlife policy issues. Pages 3-32 *in* W. R. Mangun, editor. American Fish and Wildlife Policy: the Human Dimension. Southern Illinois University Press, Carbondale, Illinois.

McCutcheon, D. M., and J. R. Meredith. 1993. Conducting case study research in operations management. Journal of Operations Management 11:239-256.

McGuire, W. J. 2001. Input and output variables currently promising for constructing persuasive communication. Pages 22-48 *in* Rice, R. E., and C. K. Atkin, editors. Public communication campaigns. Sage Publications, Thousand Oaks, California.

McMullin, S. L., and L. A. Nielson. 1999. Public involvement in natural resources allocation. Pages 87-100 *in* W. R. Mangun, editor. Public policy issues in wildlife management. Greenwood Press, Westport, Connecticut.

McTaggart, R. 1991. Principles for participatory action research. Adult Education Quarterly 41(3):168-187.

Meffe, G. K., L. A. Nielsen, R. L. Knight, and D. A. Schenborn. 2002. Ecosystem Management: Adaptive, community-based conservation. Island Press, Washington, D.C.

Meine, C. 1988. Aldo Leopold: His life and work. The University of Wisconsin Press, Madison, Wisconsin.

Merriam, S. B. and R. S. Caffarella. 1999. Learning in adulthood: A comprehensive guide (second edition). Jossey-Bass, San Francisco, California.

Mezirow, J. 1991. Transformative dimensions of adult learning. Jossey-Bass, San Francisco, California.

Mezirow, J. 1990. How critical reflection triggers transformative learning. Pages 1-20 *in* Mezirow, J. and Associates, editors. Fostering critical reflection in adulthood: A guide to transformative and emancipatory learning. Jossey-Bass, San Francisco, California.

Mezirow, J. 1995. Transformation theory of learning. Pages 39-70 *in* M. R. Welton, editor. In defense of the lifeworld. State University of New York Press, Albany, New York.

Mezirow, J. 1996. Contemporary paradigms of learning. Adult Education Quarterly 46(1):158-173.

Mezirow, J. 1997. Transformative theory out of context. Adult Education Quarterly 48(1):60-62.

Miller, S. D., and V. L. Tutterow. 1999. Characteristics of nonsport mortalities to brown and black bears and human injuries from bears in Alaska. Ursus 11:239-252.

Morecroft, J. D. W., and J. D. Sterman (editors). 1994. Modeling for learning organizations. Productivity Press, Portland, Oregon.

Nelson Rockefeller Institute of Government. 1996. The Department of Environmental Conservation: A 25th anniversary review. Nelson Rockefeller Institute of Government, Albany, New York.

New York State Department of Environmental Conservation (NYSDEC). 1976. Land resources management and planning related programs of the New York State Department of Environmental Conservation, Volume II, Sections C-F. NYSDEC, Albany, New York.

New York State Department of Environmental Conservation (NYSDEC). 1993. Summary of comments on bear management issues. NYSDEC, Albany, New York.

New York State Department of Environmental Conservation (NYSDEC). 2003a. A framework for black bear management in New York. NYSDEC, Albany, New York.

New York State Department of Environmental Conservation (NYSDEC). 2003b. Black bears in New York: natural history, range, and interactions with people. NYCDEC, Albany, New York.

Nie, M. 2004. State wildlife policy and management: The scope and bias of political conflict. Public Administration Review 64(2):221-233.

Nielsen, L. A., and D. J. Decker. 1995. Educating Natural Resource Professionals for Ecosystem Management. Renewable Resources Journal 13(1):12-17.

Nord, W. R., and S. Tucker. 1987. Implementing routine and radical innovations. Lexington Books, Lexington, Massachusetts.

Odell, J., M. E. Mather, and R. M. Muth. 2005. A biosocial approach for analyzing environmental conflicts: A case study of horseshoe crab allocation. Bioscience 55(9):735-748.

O'Meara, K., and R. E. Rice. 2005. Faculty priorities reconsidered. Jossey-Bass, John Wiley & Sons, Inc, San Francisco, California.

O'Pezio, J. 1977. Public attitudes toward black bears in the Catskills. New York Federal Aid in Fish and Wildlife Restoration Project W-89-R-21. New York State Department of Environmental Conservation, Albany, New York.

Organ, J. F., L. H. Carpenter, L. H., D. Decker, W. F. Siemer, and S. J. Riley. 2006. Thinking like a manager: reflections on wildlife management. The Wildlife Management Institute, Washington, D. C.

Organization for Economic Co-Operation and Development (OECD). 2001. Citizens as partners: Information, consultation, and public participation in policy making. OECD, Paris, France.

Otto, P., and W. F. Siemer. Learning from cognitive feedback mapping and simulation: A group modeling intervention. Systèmes d'Information et Management: in review.

Otto, P. and W. F. Siemer. 2006. Group model building: A case study to illustrate the conceptualization of a simulation model for the New York Department of Environmental Conservation. System Dynamics Seminar Series. April 14, 345 Warren Hall, Cornell University, Ithaca NY.

Otto, P. and J. Struben. 2004. Gloucester Fishery: Insights from a group model building intervention. System Dynamics Review 20(4): 287-312.

Patton, D. B., and T. W. Blaine. 2001. Public issues education: Exploring extension's role. Journal of Extension [On-line] 39(4). Available: www.joe.org/joe/2001august/a2.html. (Accessed September 2006).

Pawson, R., and N. Tilley. 1997. Realistic evaluation. Sage: London.

Peek, J. M. 1998. Experiences with a committee of user groups examining grizzly bear restoration in Idaho. Ursus 10:613-614.

Peters, S. 2007. Changing the story about higher education's public purposes and work: Land-Grants, Liberty, and the Little Country Theater. Foreseeable

Futures #6. Position papers from Imagining America: Artists and Scholars in Public Life. Syracuse University, Syracuse, New York.

Peters, S., N. R. Jordon, M. Adamek, and T. R. Alter (editors). 2005. Engaging campus and community: The practice of public scholarship in the state and land-grant university system. The Kettering Foundation, Dayton, Ohio.

Peters, S., N. R. Jordon, T. R. Alter, and J. C. Bridger. 2003. The craft of public scholarship in land-grant education. Journal of Higher Education Outreach and Engagement 8(1):75-86.

Peyton, R. B., P. Bull, T. Reis, and L. Visser. 2000. An assessment of the social carrying capacity of black bears in the Lower Peninsula of Michigan. Department of Fisheries and Wildlife, Michigan State University, East Lansing, Michigan.

Plummer, R. 2006. Sharing the management of a river corridor: A case study of the co-management process. Society and Natural Resources 19:709-721.

Portes, A. 1998. Social capital: Its origins and applications in modern sociology. Annual Review of Sociology 24(1):1-24.

Price, V., D. Tewksbury, and E. Powers. 1997. Switching trains of thought: The impact of news frames on readers' cognitive responses. Communication Research 24:481-506.

Price, V., and D. Tewksbury. 1997. News, values and public opinion: a theoretical account of media priming and framing. Pages 173-212 *in* G. Barnett and F. J. Boster, editors. Progress in Communication Sciences. Ablex, Greenwich, Connecticut.

Raik, D. B., D. J. Decker, and W .F. Siemer. 2003. Capacity building in community-based suburban deer management: The managers' perspective. Wildlife Society Bulletin 31(3): 854-864.

Reason, P. and H. Bradbury. 2001. Handbook of action research: Participative inquiry & Practice. Sage Publications, London, United Kingdom.

Rhee, J. 1997. Strategy and issue frames in election campaign coverage: A social cognitive account of framing effects. Journal of Communication 47:26-4.

Rice, R. E. 2005. "Scholarship reconsidered": History and context. Pages 17-31 *in* O'Meara, K., and R. E. Rice. 2005. Faculty priorities reconsidered. Jossey-Bass, John Wiley & Sons, Inc, San Francisco, California.

Richardson, G. P. and A. L. Pugh III. 1981. Introduction to System Dynamics Modeling with DYNAMO. Pegasus Communications, Waltham, Massachusetts.

Richmond, B. 2001. An introduction to systems thinking. High Performance Systems, Hanover, New Hampshire.

Riley, S. J., and D. J. Decker. 2000a. Risk perception as a factor in wildlife stakeholder acceptance capacity for cougars in Montana. Human Dimensions of Wildlife 5:50-62.

Riley, S. J., and D. J. Decker. 2000b. Wildlife stakeholder acceptance capacity for cougars in Montana. Wildlife Society Bulletin 28(4):931-939.

Riley, S. J., D. J. Decker, L. H. Carpenter, J. F. Organ, W. F. Siemer, G. F. Mattfeld, and G. Parsons. 2002. The essence of wildlife management. Wildlife Society Bulletin 30(2):585-593.

Riley, S. J., W. F. Siemer, D. J. Decker, L. H. Carpenter, J. F. Organ, and L.T. Berchielli. 2003. Adaptive Impact Management: An Integrative Approach to Wildlife Management. Human Dimensions of Wildlife 8:81-95.

Rittel, H. and M. Webber. 1973. Dilemmas in a general theory of planning. Policy Science 4:155-169.

Roberts, N. H., D. F. Andersen, R. M. Deal, M. S. Grant, and W. A. Shaffer. 1983. Introduction to Computer Simulation: The System Dynamics Modeling Approach, Addison-Wesley, Reading, Massachusetts.

Robertson, R. A., and M. J. Butler. 2001. Teaching human dimensions of fish and wildlife management in U.S. universities. Human Dimensions of Wildlife 6(1):67-76.

Rogers, E. M. 1995. Diffusion of innovations, 4th edition. The Free Press, New York, New York.

Romanelli, E., and M. L. Tushman. 1994. Organizational transformation as punctuated equilibrium: An empirical test. Academy of Management Journal 37(5):1141-1166.

Rowe, G. and L. J. Frewer. 2005. A typology of public engagement mechanisms. Science, Technology & Human Values 30(2):251-290.

Rouwette, E. A. J. A. 2003. Group model building as mutual persuasion. Wolf Legal Publishers, Nijmegen, The Netherlands.

Saberwal, V. K., J. P. Gibbs, R. Chellam, and A. J. T. Johsingh. 1994. Lion-human conflict in the Gir Forest, India. Conservation Biology 8:501-507.

Scheufele, D. A. 1999. Framing as a theory of media effects. Journal of Communication 49(1):103-122.

Schubert, G. A. 1957. "The public interest" in administrative decision-making: Theorum, theosophy, or theory? The American Political Science Review 51(2):346-368.

Schusler, T. and W.F. Siemer. 2004. Report on stakeholder input groups for black bear impact management in the Lower Catskills, Upper Catskills, and Western New York. Cornell Cooperative Extension of Tompkins County. Ithaca, New York.

Scott, W. A. 1955. Reliability of content analysis: The case of nominal scale coding. Public Opinion Quarterly 19:321-325.

Senge, P. M. and J. D. Sterman. 1994. System thinking and organizational learning: acting locally and thinking globally in the organization of the future. Pages 195-216 *in* Morecroft, J. D. W., and J. D. Sterman, editors. Modeling for learning organizations 1994. Productivity, Portland, Oregon.

Shanahan, J. E., and K. McComas. 1999. Nature stories: Depictions of the environment and their effects. Hampton Press, Inc, Cresskill, New Jersey.

Shanahan, J. E., D. J. Decker, and L. M. Pelstring. 2001. Communication for effective wildlife management. Pages 171-190 *in* Decker, D. J., T. L. Brown, and W. F. Siemer, editors. Human Dimensions of Wildlife Management in North America. The Wildlife Society, Bethesda, Maryland.

Shaw, W. W. 2000. Graduate education in wildlife management: Major trends and opportunities to serve international students. Wildlife Society Bulletin 28(3):514-517.

Siemer, W. F., L. C. Chase, and D. J. Decker. 2000. Empowering local communities to co-manage deer. Pages 142-157 *in* Brittingham, M. C., J. Kays, and R. J. McPeake, editors. Proceedings of the 9th Wildlife Damage Management Conference, October 5-8, University Park, Pennsylvania. College of Agricultural Sciences, The Pennsylvania State University, University Park, Pennsylvania.

Siemer, W. F., and D. J. Decker. 2008. Integrating HD into decision making: Adaptive Impact Management (AIM). Workshop presention. Integrating HD into Management Decision Making: An Orientation to Putting HD Insight to Work. Estes Park, Colorado, October 2, 2008.

Siemer, W. F., and D. J. Decker. 2003. 2002 New York State Black Bear Management Survey: Study Overview and Findings Highlights. Human Dimensions Research Unit Series Publication 03-6. Department of Natural Resources, Cornell University, Ithaca, New York.

Siemer, W. F. and D. J. Decker. 2006. An assessment of black bear impacts in New York. Human Dimensions Research Unit Series Publication 06-6. Department of Natural Resources, Cornell University, Ithaca, New York.

Siemer, W. F., D. J. Decker, and J. Shanahan. 2007b. Media frames for black bear management stories during issue emergence in New York. Human Dimensions of Wildlife 12(2):1-12.

Siemer, W. F., D. J. Decker, P. Otto, and M. L. Gore. 2007c. Working through black bear management issues: A practitioners' guide. Northeast Wildlife Damage Management Research and Outreach Cooperative, Ithaca, New York.

Siemer, W. F., M. L. Gore, and M. Merchant. 2006b. Managing Negative Human-Black Bear Interactions in New York: A few insights from a DEC-Cornell modeling project. Workshop for the Woodstock Environmental Management Council. September 27, Woodstock, New York.

Siemer, W. F., M. L. Gore, M. Merchant, and M. Ellingwood. 2006a. Old perils in new neighborhoods: Risk management and black bears in the Northeast. Northeast Fish and Wildlife Management Conference. April 23-26, Burlington, Vermont.

Siemer, W. F., P. S. Hart, D. J. Decker, and J. Shanahan. Factors that influence concern about human-black bear interactions in residential settings. Human Dimensions of Wildlife: in review.

Siemer, W. F. and P. Otto. 2005a. A group model building intervention designed to inform wildlife management decisions. 23rd International Conference of the System Dynamics Society. July 17-21, 2005. Boston, Massachusetts.

Siemer, W.F. and P. Otto. 2005b. A group model building intervention designed to inform wildlife management decisions. In Proceedings of the 2005 International Conference of the System Dynamics Society. Available from the System Dynamics Society at http://www.albany.edu/cpr/sds/conf2005/index.htm [March 20 2006].

Siemer, W. F., K. Leong, and D. J. Decker. 2007a. Cornell lands, deer, and East Hill communities: Results from a 2006 survey of community residents. Human Dimensions Research Unit Series Publication 07-5. Department of Natural Resources, Cornell University, Ithaca, New York.

Slovic, P., B. Fishhoff, and S. Lichtenstein. 1980. Facts and fears: understanding perceived risk. Pages 181-214 *in* R.C. Schwing and W. A. Alberts Jr., editors. Societal Risk Assessment: How Safe is Safe Enough? Plenum Press, New York, New York.

SPSS, Inc. 2004. SPSS for Windows Base System User's Guide, Release 13.0. SPSS, Inc., Chicago, Illinois.

Starfield, A. M. 1997. A pragmatic approach to modeling for wildlife management. Journal of Wildlife Management 61(2):261-270.

Stave, K. A. 2002. Using system dynamics to improve public participation in environmental decisions. System Dynamic Review 18(2):139-167.

Sterman, J. 2000. Business dynamics: Systems thinking and modeling for a complex world. McGraw-Hill, Boston, Massachussetts.

Stout, R.J., D.J. Decker, B.A. Knuth, J.C. Proud, and D.H. Nelson. 1996. Comparison of Three Public-involvement Approaches for Stakeholder Input into Deer Management Decisions: A Case Study. Wildlife Society Bulletin 24(2):312-317.

Tachiki, D. S. 1995. Total quality control: The Japanese approach to continuous improvement. Sakura Institute of Research, Center for Pacific Business Studies, Tokyo, Japan.

Tashakkori, A., and C. Teddlie. 1998. Mixed methodology: Combining qualitative and quantitative approaches. Sage Publications, Thousand Oaks, California.

Taylor, E. W. 1997. Building upon the theoretical debate: A critical review of the empirical studies of Mezirow's transformative learning theory. Adult Education Quarterly 48(1): 34-59.

Thomas, J. W., and D. H. Pletscher. 2000. The convergence of ecology, conservation biology, and wildlife biology: Necessary or redundant? Wildlife Society Bulletin 28(3):546-549.

Thompson, J., L. Shirreffs, and I. McPhail. 2003. Dingoes on Fraser Island-tourism dream or management nightmare. Human Dimensions of Wildlife 8:3-47.

Trefethen, J. B. 1975. An American crusade for wildlife. Winchester Press and the Boone and Crocket Club, New York, New York.

Underwood, H. B. and W. F. Porter. 1991. Values and science: white-tailed deer management in eastern national parks. Transactions of the 56th North American Wildlife and Natural Resources Conference 56:67-73.

U.S. Department of Interior, Fish and Wildlife Service, and U. S. Department of Commerce, U.S. Census Bureau. 2003. 2001 National survey of hunting, fishing, and wildlife-related recreation.

Van den Belt, M. 2004. Mediated modeling: A system dynamics approach to environmental consensus building. Island Press, Washington D. C.

Vennix, J. A. M. 1994. Building consensus in strategic decision-making: Insights from the process of group model-building. Paper presented at the 1994 International System Dynamics Conference, Stirling, Scotland.

Vennix, J. A. M. 1996. Group model building: facilitating team learning using system dynamics. Wiley, New York, New York.

Vennix, J. A. M. 1999. Group model-building: Tackling messy problems. System Dynamics Review 15:379-401.

Vennix, J. A. M, D. F. Andersen, and G. P. Richardson. 1997. Introduction: Group model-building—Art and science. System Dynamics Review 13(2):103-106.

Wadsworth, Y. 1998. What is participatory action research? Action Research International [online]. http/scu.edu.au/schools/gcm/ar/ari/p-ywadsworth98.html. Accessed April 2008.

Walters, C. J. 1986. Adaptive management of renewable resources. McGraw-Hill, New York, New York.

Ward, K. A. 2003. Faculty service roles and the scholarship of engagement. Josse-Bass in cooperation with ERIC Clearinghouse on Higher Education, The George Washington University, Washington D.C.

Weissglass, J. 1990. Constructivist listening for empowering change. The Educational Forum 54(4): 351-370.

Wilson, J. Q. 2000. Bureaucracy: What government agencies do and why they do it? Second edition. Basic Books, New York, New York.

Wolch, J. R., A. Gullo, and U. Lassiter. 1997. Changing attitudes toward California's cougars. Society & Animals 5(2):95-116.

Wolf, S. A. Network forms in production of multifunctional landscapes. Unpublished manuscript. Department of Natural Resources, Cornell University, Ithaca, New York.

Wondolleck, J. M., and S. L. Yaffee. 2000. Making collaboration work: Lessons from innovation in natural resources management. Island Press, Washington, D. C.

Yin, R. K. 2003. Case study research: Design and methods (3rd edition). Applied Social Research Methods Series Volume 5. Sage Publications: Thousand Islands, California.

Zigurs, I., and B. K. Buckland. 1998. A theory of task/technology fit and group support systems effectiveness. MIS Quarterly 22(3):313-334.

Zinn, H. C., and C. A. Pierce. 2002. Values, gender, and concern about potentially dangerous wildlife. Environment and behavior 34(2):239-256.